Spring 5-1953

Volume 64 - Issue 8 - May, 1953

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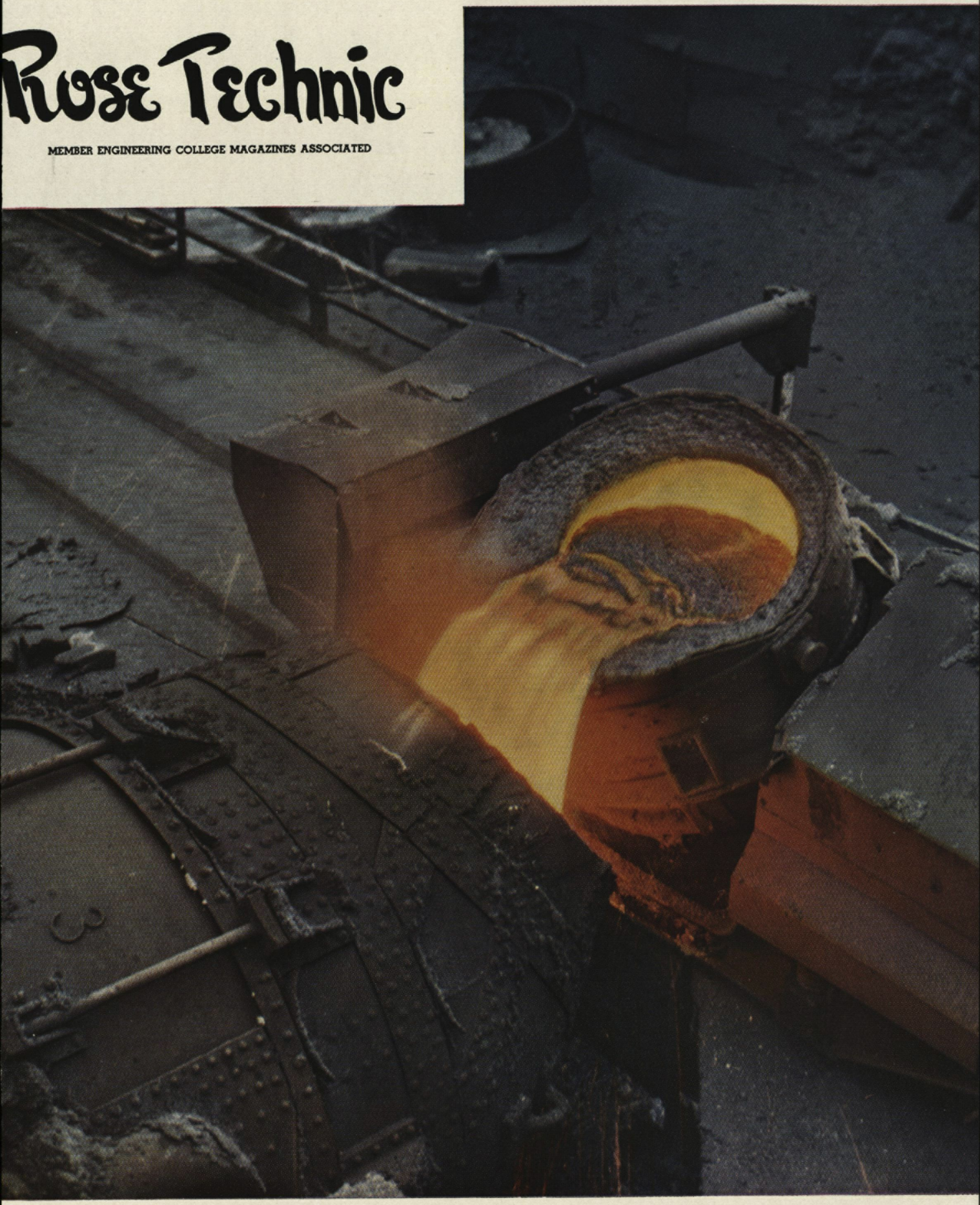
Rose Technic

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED



May, 1953

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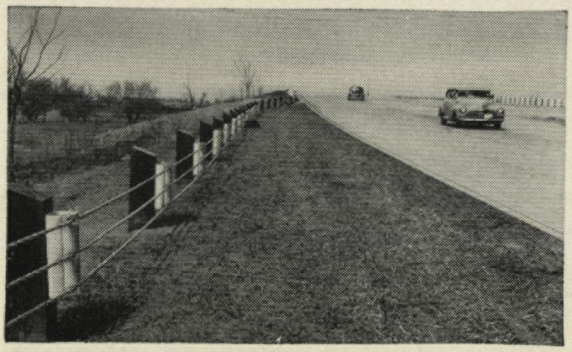

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Rose Technic

VOLUME LXIV, NO. 8 MAY, 1953

In This Issue

The Cover

It won't be long before the fireworks start in the big Bessemer converter on the cover. Once the hot metal has been added, the converter tips back and begins to blow like a fiery whale. In a process much like gargling, air roars up through the metal, raising the temperature rapidly and oxidizing impurities. A converter load of steel is finished in about 12 minutes. Courtesy of STEELWAYS, Published by the American Iron & Steel Institute.

The Frontispiece

Courtesy of GENERAL ELECTRIC.

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One day of feeling better doesn't mean you're cured

EVER HAVE FLU, feel better, and go out too soon—only to have a relapse worse than the first attack?

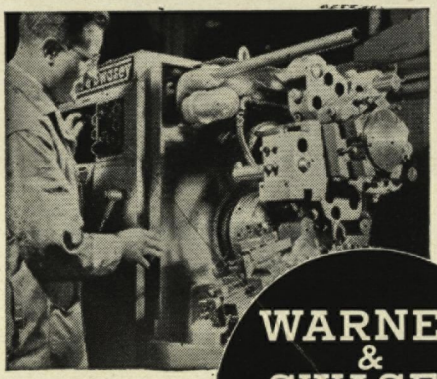
For years the world has been sick. "Something-for-nothing," Welfare State, Socialism, "more-pay-for-less-work"—the disease has different names at different times and places, but it's the same trouble—loss of energy, ambition, faith-in-yourself.

Now much of the world and especially this part of it is feeling better; we think we'll live—as this is written it looks as though more housing, lower prices, lower taxes, and most important of all, less war, are in prospect. BUT—

Don't let's take it too easy too soon. The fever of inflation and debt have wasted the nation's strength and substance which have to be built back. If we continue our tried and true American medicine of hard work, and add the convalescent tonic of thrift, we'll really recover. But as any doctor knows, this first surge of "feeling better" is the dangerous stage:

A relapse could kill us.

Warner & Swasey is always interested in talking future opportunities to young men of ability and character. Write Charles Ufford.



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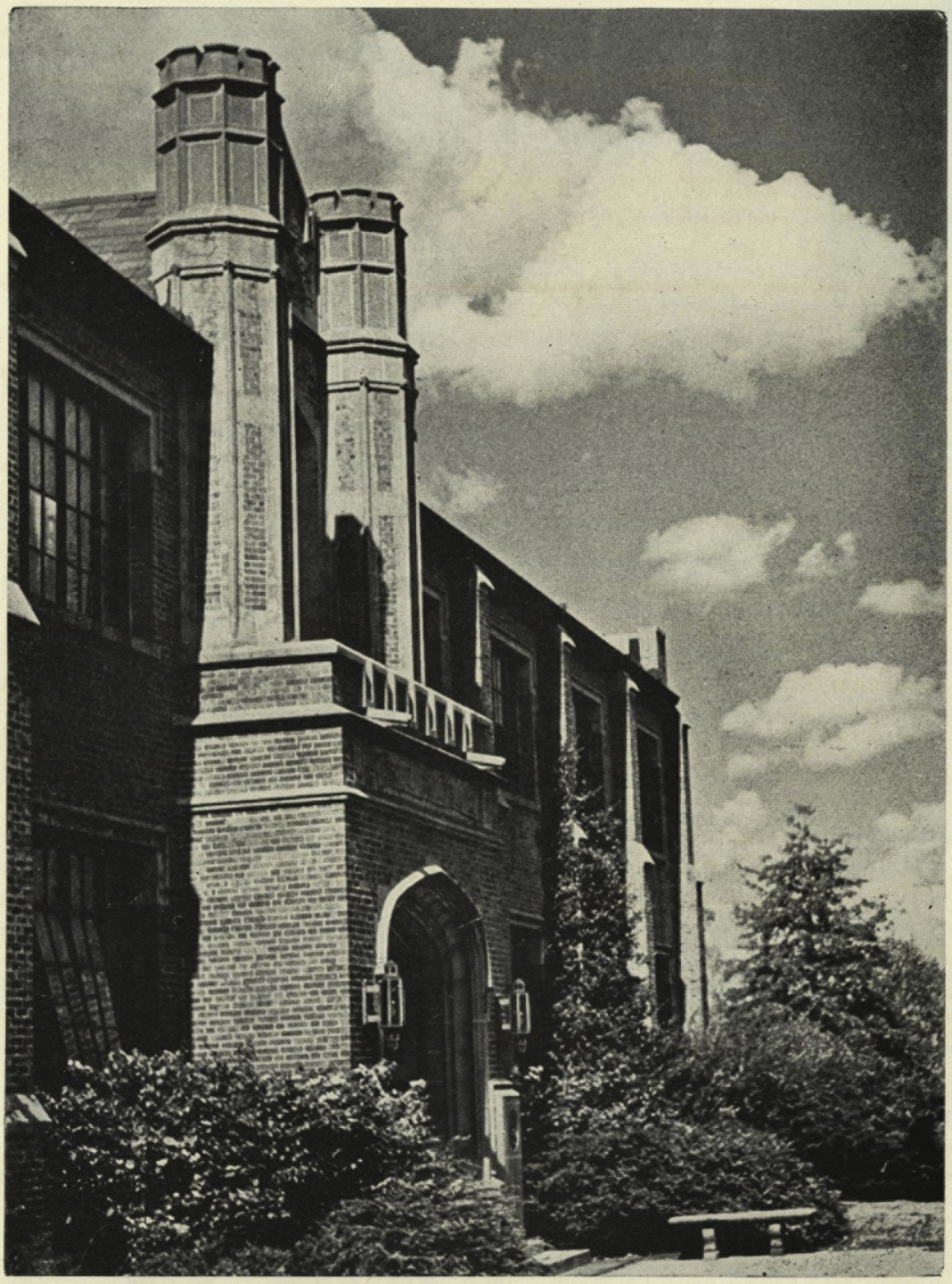

HIGH SCHOOL GRADUATES OF 1953

You are cordially invited to visit Rose Polytechnic Institute during the present school year to learn more about your college entrance and the engineering courses available to you at Rose. The next freshman class will be admitted September 8, 1953.

NOBLE C. BLAIR

Admissions Counselor

ROSE POLYTECHNIC INSTITUTE

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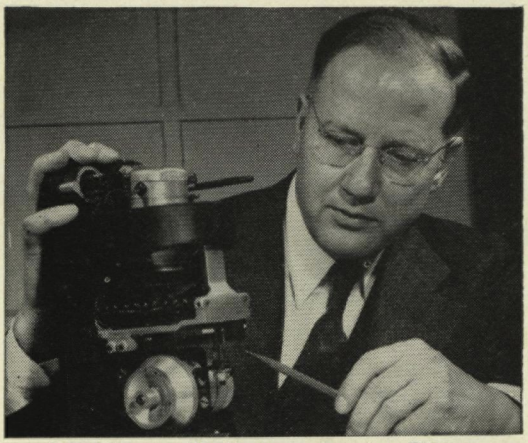

DR. CLINTON R. HANNA, *Associate Director*
Westinghouse Research Laboratories
Enrolled in Westinghouse Graduate Student Training Course after graduation from Purdue University in 1922. Dr. Hanna, with over 100 patents to his credit, is one of the nation's leading authorities on gyroscopically controlled regulating devices.

CARROLL V. ROSEBERRY, *Manager*
Westinghouse Electric Utility Department
Upon graduation from Oklahoma A & M in 1934, he enrolled in the Westinghouse Graduate Student Training Program. Assigned first as a salesman, he was advanced to district Assistant Electric Utility Manager, branch Electric Utility Supervisor, and in 1951 was appointed to his present post.

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Westinghouse Consulting Engineer
Enrolled in Westinghouse Graduate Student Training Course after graduation from Cornell University in 1926. Dr. Harder has become nationally known for his analytical and development work in power systems. He is co-developer of the Anacom, an electric analogue computer.

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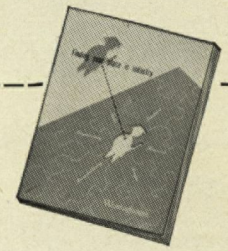

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Progress

A movement is under way, the effects of which are already being felt and should continue to be significant for years to come. A long-range program by a committee of the faculty for critical study of curriculum content and organization has resulted in the introduction of a freshman course in engineering calculations, the elimination of economic geography from the curriculum, and several other course changes.

Student opinion—obtained through informal chats, classroom questionaires, and a Blue Key-Tau Beta Pi-faculty dinner which promises to be an annual event—has played a major role in this study and will continue to do so. More than ever before, constructive student criticism may be expected to yield positive results.

Careful study of the type now being carried on requires time. An awareness, however, that **something** is being done should develop an attitude of patience in the student body.

A salute to Rose's pioneering engineering educators!

R.C.B.

R.A.K.

Coal into Chemicals through Coal

EDITOR'S NOTE: *The following is a portion of a paper presented by R. Alan Klaus before the meeting of the North Central District of the A.I.Ch.E. in Detroit, Michigan, on April* 25, 1953.

An outstanding recent advance in chemical processing, coal hydrogenation, might be ranked in importance with the oil industry's great fluid catalytic-cracking process, but its implications go much further. Whereas catalytic cracking was the culmination of a long series of chemical processes working on petroleum, the techniques introduced by Carbide & Carbon Chemicals Company are the first to be applied in the direct processing of coal to produce chemicals.

The term "coal hydrogenation" has been tossed about for so long that the uninitiated might easily suppose that it has long been an accomplished fact. But until now it wasn't, in any useful sense. From the start, coal hydrogenation was delayed and diverted by an obsession with its liquid-fuel aspects, which, on long as world petroleum is freely and reasonably available, make it uneconomic.

The hydrogenation process goes all the way back to 1913, when the noted German chemist, Dr. Friedrich Bergius, published his basic discovery that coal could be liquefied by hydrogen under high heat and pressure to produce, among other things, oil products. Pressed by wartime shortages or threats of petroleum shortages — under conditions which allowed ecnomics to be ignored — the governments of Germany, England, and the United States have operated coal hydrogenation plants for the production of liquid fuels.

All so-called "synthetic fuel" hydrogenation plants first convert coal into a heavy aromatic oil and then further hydrogenate this oil into gasoline. Since the aromatic compounds in the heavy oil probably have market values ranging from 40 cents to several dollars a pound, this amounts to spending perhaps 10 cents to convert 40 cents worth of aromatic compounds into a gallon of 15 cent gasoline.

Carbide makes the easy first step of the hydrogenation — and the stops. All but the 10% of the coa which is present in the form of fre carbon is liquified in this step. Mos of the products are heavy, mult ring, or substituted aromatic com pounds which have high actual c potential market values.

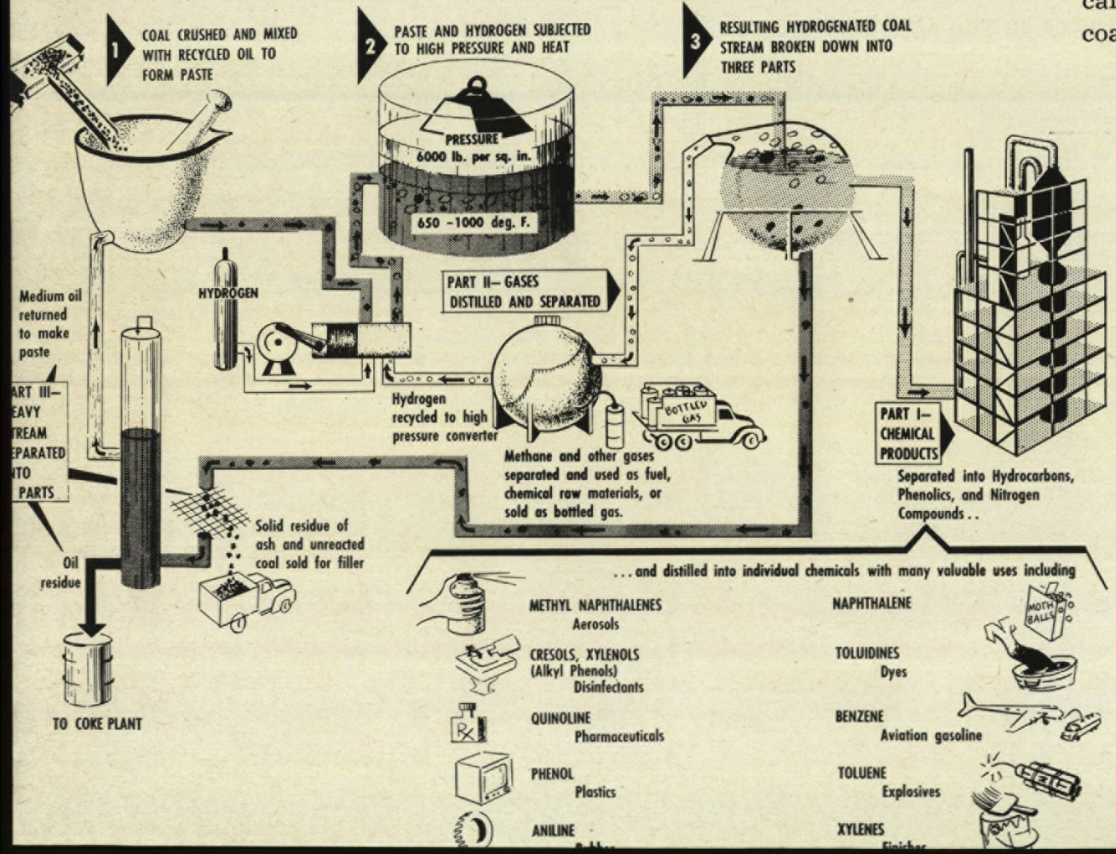
Modern coal chemistry picture the carbon in coal as bonded in multiple hexagon lattice in the forn of a giant molecule or polymer. Pic torially, the structure looks like chicken coop fence or a title bath room floor. Carbide researchers hav applied the name "chicken-wir chemistry" to the study of coal de rivatives, and the name is likely t stick. Following this analogy, th principle of the Carbide approach t subject the carbon lattice to jus enough stress to break a few of th strands so that it comes apart i fairly large pieces. Hydrogen act as the wire cutter but only 3 to 6% by weight of hydrogen is actuall used in the reaction, about half th amount absorbed in a "synthet fuels" producer.

Hydrogenation versus Coking

For more than a century chem cals have been obtained directly fro coal as the by-products—increasing ly valuable by-products — coke ovens. That chemicals ar far from by-products of hy drogen is evident from sever examples. Per ton of coal, hy drogenation will yield five eight times more naphthalen and 60 to 80 times more phenc It will also increase some sma components, such as quinolin by as much as 300 to 500 time What is more, it will produc some chemicals, such as an line, which are almost com pletely destroyed in the 1100° operating temperatures of col ovens. So far, Carbide ha identified more than 100 chem cals in the mixture of gase

THE ROSE TECHN

COAL INTO CHEMICALS— Carbide and Carbon Chemicals' Coal Hydrogenation Process



Hydrogenation

By R. Alan Klaus, ch.e., sr.

liquids, and solids that it gets from hydrogenating coal, many of them heretofore commerciallv unavailable.

From Coal Vein to Hydrogenation Plant

There was a time when Carbide felt duty-bound to investigate the possibilities of underground gasification of coal—that is, of burning coal right where it lies and piping the resultant gases to the surface. Others have tried and are still trying this, incluling the Federal Government, but Carbide has now rejected the scheme as quite unfeasible. However, they did tackle it several years ago by drilling a small hole into a mountain coal seam and igniting it. This fire promptly snuffed itself out from lack of air. So a larger hole was drilled, and then a larger one. When the bore had been increased to thirty-six inches, the coal burned well, but it was discovered that the frequent extension and rearrangement of the gas-gathering pipes was a thorough nuisance, costly, unpleasant, and sometimes dangerous.

It also became apparent that in devising a machine to bore a yard-wide hole for proper air supply the experimenters had invented a successful digger. In order to drive the hole into the seam, this machine was forced to dig coal and pass it back outside. In fact, coal was being mined in order not to mine coal. The rather obvious conclusion was reached to enlarge the machine and get the coal outside, dispensing with all the underground firing and piping trouble.

The machine developed is a squat, electric - driven, caterpillar - track giant, with one biting row of tungsten-carbide-tipped cutting wheels in the front, much like other continuous miners. The unit is operated from a control shed on the side of a mountain, from which it proceeds to cut into a coal seam, discharging a stream of broken coal behind it by means of a conveyor. As the machine disappears into the mountain, through the three-by-ten-foot hole it is digging, additional lengths of conveyer are hooked onto its rear. Two "feel-el" cams on the outer edges of its cutting head send back electric impulses to oscilloscopes in the control shed. An operator reads on the oscilloscope the comparative hardness of material through which the machine is cutting and steers it by remote control to keep it on the soft seam. The unit's range is limited only by the amount of electric cable and conveyor it can drag. So far it has gone in 600 feet unattended, with 1,000 feet a nearby goal. It has been mining coal at the rate of nearly two tons a minute, piling up as much as 1,200 tons in one twenty-four-hour day.

The Pilot Plant

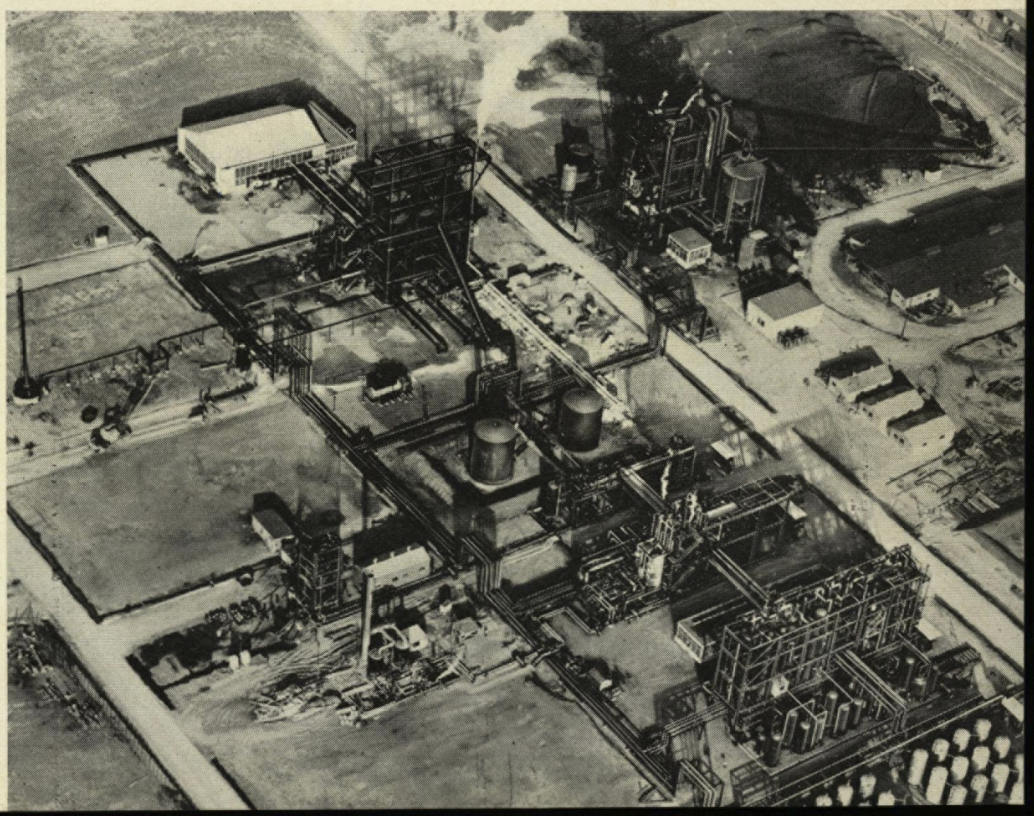
What is believed to be the world's first high-pressure coal hydrogenation unit designed to produce chemicals as the primary products was placed on a stream at Institute, West Virginia, by Carbide in April 1952. Costing eleven million dollars and requiring four and one-half years to design and build, the plant was the culmination of seventeen years of research work that cost about eight million dollars. Another two million dollars has been poured into the project during the first year of operation.

Carbide's pilot plant originally treated 300 tons of coal daily—a 300-fold scale-up of laboratory work. Recently the rate has been increased to 550 tons per day. Only 50 men are required to operate the whole plant.

The unit has a five-fold purpose: (1) to yield design and operating data for a commercial unit; (2) to show how much of which chemicals can be economically recovered under various operating conditions; (4) to get additional data on catalysts; and (5) to recover enough products to start product evaluation and market development.

The plant's complex process can be separated into three phases: (1) preparation of the coal; (2) reaction with hydrogen; and (3) separation

(*Continued on page* 22)



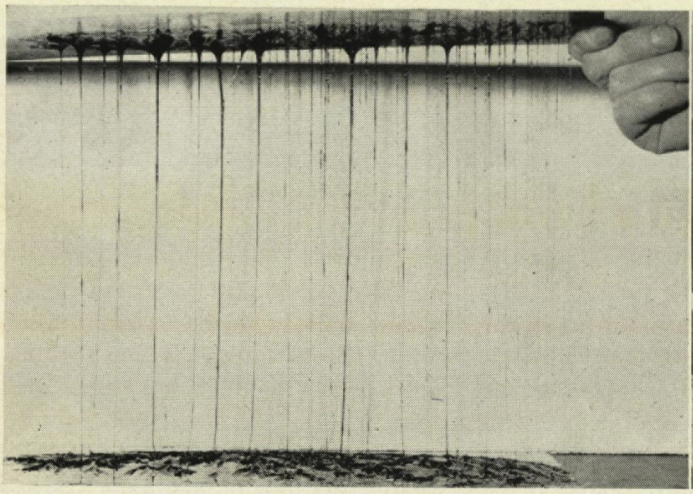
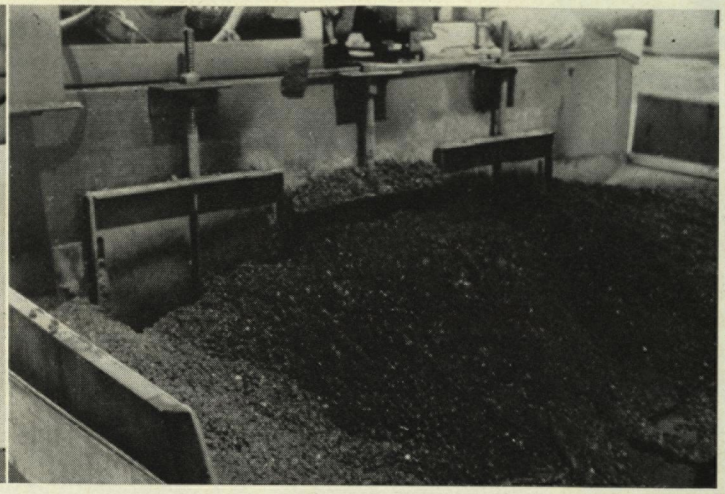


Illustration of the elastic and binding qualities of rubberized bitumen.



Rubberized mixture in spreading machine.

Rubber Roads

By John C. Scott, fresh.

In present days of high highway costs and great needs for both new construction and adequate maintenance, highway engineers are always on the lookout for new materials and methods to solve their problems. Ever since rubber was first used as erasers for pencils nearly two hundred years ago, its variety of uses has increased in number many, many times. Its value to nations, both in times of war and peace, cannot be underestimated; whole populations ride on vehicles with rubber wheels. Now it appears extremely likely that they will also ride over roads containing rubber.

Use of rubber in highway pavements is not a new idea; various individuals and groups have been experimenting with it for over thirty years. Engineers of The Netherlands laid several rubber-asphalt pavements just before World War II. Two armies (first the German and then the Allied) rolled over one of the roads between Amsterdam and The Hague, moving heavy equipment which would have damaged other pavements. Today, this same highway is in good condition and carrying its share of traffic after more than fourteen years of use.

Greater wearing qualities and long life of rubber roads can be atrributed to the characteristics of rubber itself. Just as a rubber band stretches, so do the particles of rubber in a road "give" when placed under strains that might break other pavements under the same conditions. You have probably noticed that some bituminous pavements get soft in hot weather; so do they become brittle in cold weather. Addition of rubber to the paving material reduces the degrees of these changes, resulting in less maintenance.

Although natural and synthetic latex in asphalt emulsions are being studied, rubber powder is the usual form of rubber used, being composed of small granules about the size of grains of sand. When added to the bituminous paving material, these granules absorb some of the lighter components of bitumen, which is the sticky stuff generally called tar and which acts as the binder for the other materials in the process. This absorption by these granules causes them to swell to about twice their original size, giving them even greater resiliency. The addition of the powder may be made either directly to the asphalt just before mixing with the aggregate, or to the aggregate in the mixing chamber before the introduction of the asphalt.

Many different kinds of rubber have been used in experiments to date, and the different kinds (reclaimed, natural, or synthetic) have shown different characteristics. Extensive research in this field is being conducted by the Natural Rubber Bureau Research Laboratory, Rosslyn, Virginia. This bureau has acted as consultants on many test installations and can furnish additional information on request.

Because of the great variety of types of asphalt mixes used in this country, no fixed specifications have been set for amounts of rubber to be used in mixes. Amounts used vary, but are under ten per cent, depending on types of aggregate used. It has been the practice to add the rubber to mixtures already having set specifications and then to see what changes the rubber effected. Neither have laying methods been changed. Although the addition of rubber causes some change in consistency of the mixes, it is not great

(*Concluded on page* 30)

WONDER DRUGS unlimited

By Donald Wood, ch.e., soph.

EDITOR'S NOTE: *The following is the first in a series of articles dealing with the industries of Terre Haute and the surrounding vicinity. It is hoped that these articles may serve to both acquaint the reader with and stimulate his interest in the various industries of this region. Mr. Wood, the author, has worked for Pfizer's for the past three summers, and therefore has a firsthand knowledge of his subject.*

The name of Charles Pfizer & Co. has long been associated with fine chemicals. Since the time of its inception, in 1849, the firm has occupied a major position in the drug industry.

In 1941, Pfizer was selected, along with two other drug manufacturers, to produce penicillin. This provided the impetus for a research and development program that has earned for the company the proud title of "World's Largest Producer of Antibiotics." The research on penicillin and in allied fields led to the discovery and development of Terramycin, a broad spectrum antibiotic.

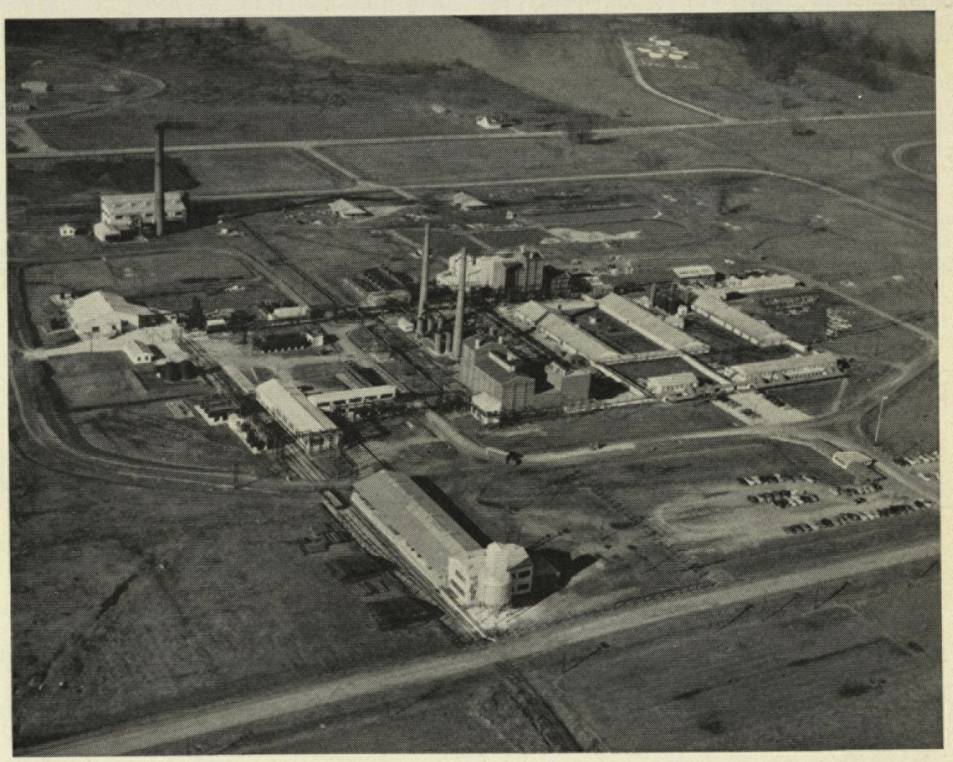
At the end of World War II Pfizer started a large scale expansion program. A new plant was built at Groton, Conn., and at Terre Haute, Indiana, a former Government Ordnance Plant was leased for the production of fermentation products.

With the discovery, in 1950, that small amounts of certain antibiotics such as terramycin and penicillin would speed the growth of pigs and poultry, and aided by the development of Vitamin B-12 as an important nutritional factor, Pfizer became one of the leading suppliers of animal feed supplements. Soon on the market was a complete line of antibiotics and vitamin concentrates for animal feed manufacturers. The increasing importance of this feed supplement program was emphasized recently when it was announced that 10% of the total 1952 sales of Charles Pfizer & Co. were in agricultural products manufactured at the Vigo plant, Terre Haute, Indiana.

Last year a big step forward was taken when the Agricultural Division of Charles Pfizer & Co. was formed. This division, aided by the Research Farm and Laboratories at Terre Haute, is devoted to the development and evaluation of products for the animal feed industry which will result in an improvement in farm performance through better nutrition, shorter growing periods, and improved survival chances. The research of this division is proceeding along three lines; antibiotics, vitamins, and extra growth factors. Antibiotics help young growing animals to increase their rate of gain, improve livability, and tend to eliminate 'runty' animals. Vitamin research has been devoted to development of better methods of incorporating the vitamins in animal feeds. The subject of 'extra' growth factors is a puzzling one. Pfizer scientists are presently conducting tests on all kinds of nutritious foods in an attempt to determine the factor, or factors, which promote extra rapid growth in animals.

(*Concluded on page* 40)

Vigo Plant of Chas. Pfizer Co., Terre Haute, Ind.



Camp

By Jack Farell, jr., ch.e.; Jack

Faculty Fossils Undefeated

We who had thought that the talents of our faculty were limited to the wielding of a piece of chalk before a blackboard have been forced to revise our opinion. You see, we Rose men have recenty been reminded that the faculty is also quite capable of wielding a big stick in front of home plate. This reminder has come in the form of a recently organized faculty softball team officially known as the "Facuty Fossils", but perhaps more often called "Strum's Bums" in honor of Dean Strum, player-manager of these "nine old men."

When word of the organization of this team first reached the students, everyone considered it something of a joke; every student knows that a college professor is merely "a textbook wired for sound" and textbooks just don't play ball. However, laughs of derision quickly changed to looks of wonder when the venerable veterans defeated the senior electricals by a margin of 10-7. In this hotly contested event, Dr. "Babe" Bankoff found the range and came through with two terrific home runs. Just to prove that this first victory was no chance happening, the witty wizards of the diamond were victorious over the freshmen of section C by the overwhelming score of 12-6. In this game, the slugger for the dauntless duffers was Sergeant Arthur, who clouted a four-bagger for the old timers.

Following is the official roster of the "Faculty Fossils":

Catcher	"Passed-ball" Arthur
Pitcher	"Beanball" Haist
First Base	"Stretch" Anderson
Second Base	"Slugger" Jacobs
	"Cork" Criss
Third Base	"Bow" Baughman
Left Field	"Babe" Bankoff
Center Field	"Dunk" Duwelius
Right Field	"Killer" Guthrie
	"Hermie" Moench

Since finding out how good they really were, the superannuated supermen have cancelled their previously scheduled game with the V.F.W. (Spanish-American War, of course) and are presently challenging all comers. The students have so rapidly accepted the call to battle on the field of honor that the fossils are now scheduled for the rest of the season.

It has been rumored that one of the reasons for the fine showing of these antiquated athletes is that Dr. Clarence P. Sousley, a renowned mathematician, has been writing the formulas for the curves used by "Beanball" Haist. It has also been heard through the student grapevine that both the Yankees and the Cardinals have been scouting the team for "young" talent, and there have been some indications that the salaries of Rose's professors may have to be raised to keep them out of the big leagues.

Attention!! Inspection Arms!

Baseball

The baseball team started its season by losing two very high scoring ball games. The season's opener against Franklin was lost 14-8. This loss was followed by another, this one to Greenville, 12-8. In this game Rose led 7-2 at the end of the seventh, however, in the eighth the roof fell in.

The team got its first win against Huntington 3-2. This game was called at the end of seven innings because of rain. Roy England gave up only five hits. The engineers got all three runs in the fourth inning on hits by Scott, Kallis, England, and Kalen.

Rose Relays

Earlham won this year's Rose Relays with a total of 67½ points. They were followed by Hanover and Indiana Central. Earlham's Larry Goens was chosen the outstanding athlete of the day.

The Rose team finished fifth in a field of ten teams. High spot of the day for Rose was a first place in the shuttle hurdle relay. This was Rose's first relay win in the history of the Relays. This winning team was anchored by "Iron Man" Harry Badger, who tied for first in the high jump and for second in the pole vault, and ran on the half mile relay team.

Parent's Day

Sunday, May 17, has been established as the date for this year's Parent's Day. Last year, which was the first time this type event was tried, proved a great success.

On this day, the parents can

urvey

and Herbert Smith, soph., e.e.

meet and talk to any and all the professors. The parents get some strange descriptions of some professors, so it is interesting for them to see things as they really are.

The day's program will, as the Blue Key is planning now, include a dinner at noon followed by a few talks.

The Engineer

Verily, I say unto you, marry not an engineer for the engineer is a strange being possessed of many devils; yea, he speaketh eternally in parables, which he calleth "formulas," and he wieldeth a big stick which he calleth a slide rule, and he hath but one Bible—a handbook.

He talketh always of stresses and strains, and without end of thermodynamics. He showeth always a serious aspect and seemeth not to know how to smile; and he picketh his seat in the car by the springs therein and not by the damsel beside him; neither does he know a waterfall except for its power, nor the sunset except for her specific heat.

Always he carrieth his books with him, and he entertaineth his maiden with steam tables. Verily, though his damsel expecteth chocolates, when he calleth he openth the packages to disclose samples of iron.

Yea, he holdeth his damsel's hand, but only to measure the friction, and kisses but to test viscosity. For in his eyes shineth a far-away look which is neither love nor longing—but a vain attempt to recall a formula.

There is but one key dear to his heart, and that is the Tau Beta Pi key; and one love letter for which he yearneth, and that an "A"; and when to his damsel he writeth of love and signeth with crosses, mistake not these symbols for kisses but rather for unknown quantities.

Even as a young boy he pulleth a girl's hair to test its elasticity, but as a man he discovers different devices; for he would count the vibrations of her heart strings and reckon her strength of materials; for he seeketh ever to pursue the scientific investigations, and inscribeth his passion in a formula; and his marriage in a simultaneous equation involving two unknowns and yielding diverse answers.

Junior Prom.

Graduation Day

Graduation day is drawing near, and 59 seniors are preparing for the event. The number of degrees that will be conferred, by departments, are: Chemical Engineering, 9; Civil Engineering, 12; Electrical Engineering, 19; and Mechanical Engineering, 19. This spread of degrees compares closely with the national average, with Rose granting slightly more Chemical Engineering and slightly less Civil Engineering degrees than average.

Those students who will graduate with high honors are R. Alan Klaus, Robert C. Bosshardt, Robert W. Ray, and Alfred D. Bosley. It is interesting to note that Klaus, Bosshardt, and Ray have gone through grade school, junior high school, high school, and college together and have always been at the head of their class, although their respective positions have changed from time to time. Robert Bosshardt won the bronze Heminway medal his freshman year for outstanding scholastic achievement.

David H. Badger, William D. Nelson, and Richard F. Grubaugh will graduate with honors. Other students may rise to this position before the end of the year.

All members of the graduating class either have accepted jobs or have offers of employment under consideration.

Engineering Educators Meet At Rose

Over two hundred leading teachers in the field of engineering education throughout Illinois and Indiana are expected to take part in the sixteenth annual meeting of the Illinois-Indiana Section of the American Society for Engineering Education, according to Professor Herman Moench, Chairman of the Section.

Meeting on the campus of Rose Polytechnic Institute for the first time since 1949, the group will register at 9:30 A.M. on Saturday, May 16th and then divide up for departmental conferences and panel discussions in the fields of Aeronautical Engineering, Chemical and Metallur-

(*Concluded on page* 42)

Professor Knipmeyer Leaves Rose

Having completed 44 years of service at Rose Polytechnic Institute and due to retire next year, Professor C. C. Knipmeyer, head of the school's electrical engineering department since 1920, left the first of this month for Turkey where he will spend 18 months.

He was chosen to advise on electrical problems in connection with the power plants and coal mines owned by the Turkish government. The choice was made by the Paul Weir Company of Chicago, consulting engineer and American representative of the Turkish government.

While reluctant to lose Mr. Knipmeyer as a member of the Rose faculty, Dr. Ford L. Wilkinson, Jr., president of Rose, said, "We are happy and proud to have Professor Knipmeyer chosen for this consultant work. During his years at Rose he has served as engineering consultant for many industries in the Terre Haute area, particularly in coal mines and power plants. He will be utilizing his many years of experience in aiding Turkey and, through this co-operation, cementing Turkish-U. S. friendly relations."

Mr. and Mrs. Knipmeyer, whose home is at 2611 North Eighth Street, flew from here to New York about the first of the month. They boarded a transoceanic flight at New York, going to their destination by way of Labrador, Ireland, England and Germany. They landed at Istanbul, Turkey, first and then at Ankara, the Turkish capital. A narrow-gauge railway took them from Ankara to their ultimate destination, Zonguldak.

They were not the first Terre Haute couple to arrive in the Turkish community. Mr. and Mrs. Fred Bieler left the middle of last month for two years there. Mr. Bieler is assistant to the superintendent of construction of 15 miles of tunnels which will tap chrome and coal deposits. Arrangements for his work there also were made by the Paul Weir Company.

The Knipmeyers will make their home in a furnished apartment on the shore of the Black Sea. The apartment is provided by the Turkish government for its foreign employes and is in a housing community where Paul Weir associates were ready to welcome the newcomers.

Professor Knipmeyer was named a Fellow of the American Institute of Electrical Engineers at its meeting in the Fall of 1951. The preceding year he was chosen by the Indiana Society of Professional Engineers as "Engineer of the Year 1950 in Indiana." In 1942 he was internationally honored by being one of 10 to be initiated into the "Calling of an Engineer" by the Engineer Institute of Canada.

He was chosen a Fellow by the A. I. E. E. in recognition of his many years of effort devoted to the interests of professional engineering. A member of the southwest region committee of Engineer Schools of the Engineering Council for Professional Development and for five years its chairman, Professor Knipmeyer has been actively engaged in a program of inspecting and accrediting engineering schools in the entire southwest part of the United States.

He also has contributed much to

(*Concluded on page* 40)

Professor C. C. Knipmeyer

THIS NEW AUTOMOTIVE LABORATORY at Standard Oil's Whiting Research Laboratory is now in operation testing and developing new and improved gasolines and lubricants.

They help design the future

• In the laboratories of today, the world of tomorrow is taking shape—test by test, experiment by experiment.

What man will be capable of in years to come, how he will work and play, how he will travel, all depend to a large extent on the fuels and lubricants that will power the machines of the future.

More than a quarter of a century ago Standard Oil opened its first automotive laboratory, and from time to time has enlarged the facilities.

Now Standard Oil has added still another unit. The new building located at Whiting, Indiana, is devoted entirely to the testing and development of automotive fuels and lubricants.

Full-scale testing is conducted in a room containing every needed facility for the measurement and control of operating conditions. The test engines include the principal types used today or anticipated for the future. Each of 16 engines, with its dynamometer, is mounted on a separate concrete foundation, isolated from other parts of the building to eliminate vibration.

In the expansion of our laboratories, young technical men find evidence that the challenge of the future, with its stimulation and rewards, is being met at Standard Oil.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD

Alumni News

By Lawrence Ogborn, e.e., jr.

'13 Thomas A. Novotney, E.E., besides his former job as Sales Manager for Replacement Parts, the S. K. William Company, is now also the President of the S. K. William Company of Canada. Mr. Novotney resides in Cleveland, Ohio.

'19 Adolph E. Reinhard, M.E., has been appointed Assistant Vice President in charge of all steel production of the Great Lakes Steel Corporation. Associated with Great Lakes since December, 1943, Mr. Reinhard first was Superintendent of Steel Production. He was placed in charge of production of both No. 1 and No. 2 open hearth departments in August, 1951, holding that position until his promotion this month. Prior to joining Great Lakes, Mr. Reinhard was employed by the Youngstown Sheet and Tube Company and the Wheeling Steel Corporation.

'27 William L. Hillis, C.E., is the Chief Engineer for the Contract Awards Branch of Peter Kiewit Sons. Mr. Hillis is located at the Atomic Energy Plant in Portsmouth, Ohio.

'29 Professor Herman A. Moench, E.E., has been named a member of the State Board of Registration for Professional Engineers and Land Surveyors. Professor Moench will fill the vacancy on the board occasioned by the resignation of Professor Clarence C. Knipmeyer. The appointment was made by Indiana Governor, George Craig.

'35 Lewis S. Lyon, Ch.E., is the Regional Director of the Sixth U. S. Civil Service Region. Mr. Lyons has accepted the chairmanship of the federal employees division of the cancer fund campaign for Cincinnati and vicinity.

'39 Malcolm Steele, M.E., "made" the March 2 issue of the *Saturday Evening Post.* Steele, who is assistant to the head of Supersonic Wind Tunnels and chief of the Airflow Optics Section at Aberdeen Proving Ground, Maryland, is one of the officials who is quoted by Milton Lehman in his article on the proving ground, entitled, "They Just Love to Wreck Things." Steele explained the purpose of the tunnel to Lehman, gave him its cost as $2,500,000 and then let him watch the testing of a model tank in it. Mr. Steele was sent to the Aberdeen Proving Ground by the U. S. Army as a skilled technician from 1941 to 1945. After he was released from service in the Army in 1945 he continued at Aberdeen Proving Ground as a civilian employee.

Feb. '43 W. T. Weinhardt, M.E., has a son, Stephen Allen. Mr. Weinhardt is now Plant Engineer for Collins Radio Co., Cedar Rapids, Iowa.

Dec. '44 Charles A. Stringfellow has been transferred from Peoria, Illinois, to Monroe, Louisiana. Mr. Stringfellow is a supervisor at the Commercial Solvents Corporation there.

'45 Herb Bailey, Ch.E., E.E., has a son, John. Mr. Bailey is a graduate student in mathematics at Purdue.

Oct. '48 William E. Backes, C. E., E.E. is now Engineer-Special Hazards Department for the Automatic Sprinkler Company of America. Mr. Backes is now located in Youngstown, Ohio.

Nov. '49 John Bruner, Ch. E., has been released from service with the Engineer Corps. Mr. Bruner recently visited Rose Poly.

Aug. '50 Ensign Morton W. Hief, M.E., of Jasper, Ind., graduated from the Navy's only Officer's Candidate School at Newport, R.I., on May 8, 1953.

Ensign Hief received in four months the same training that NROTC students receive in four years. He may now go to specialist school.

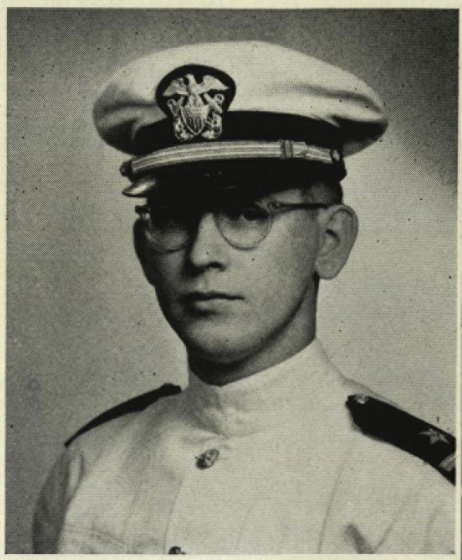
Aug. '50 JoDean Morrow, C.E., has recently visited Rose Poly. Mr. Morrow has been released from service with the U. S. Army. He had previously been stationed in the Engineers School, Fort Belvoir.

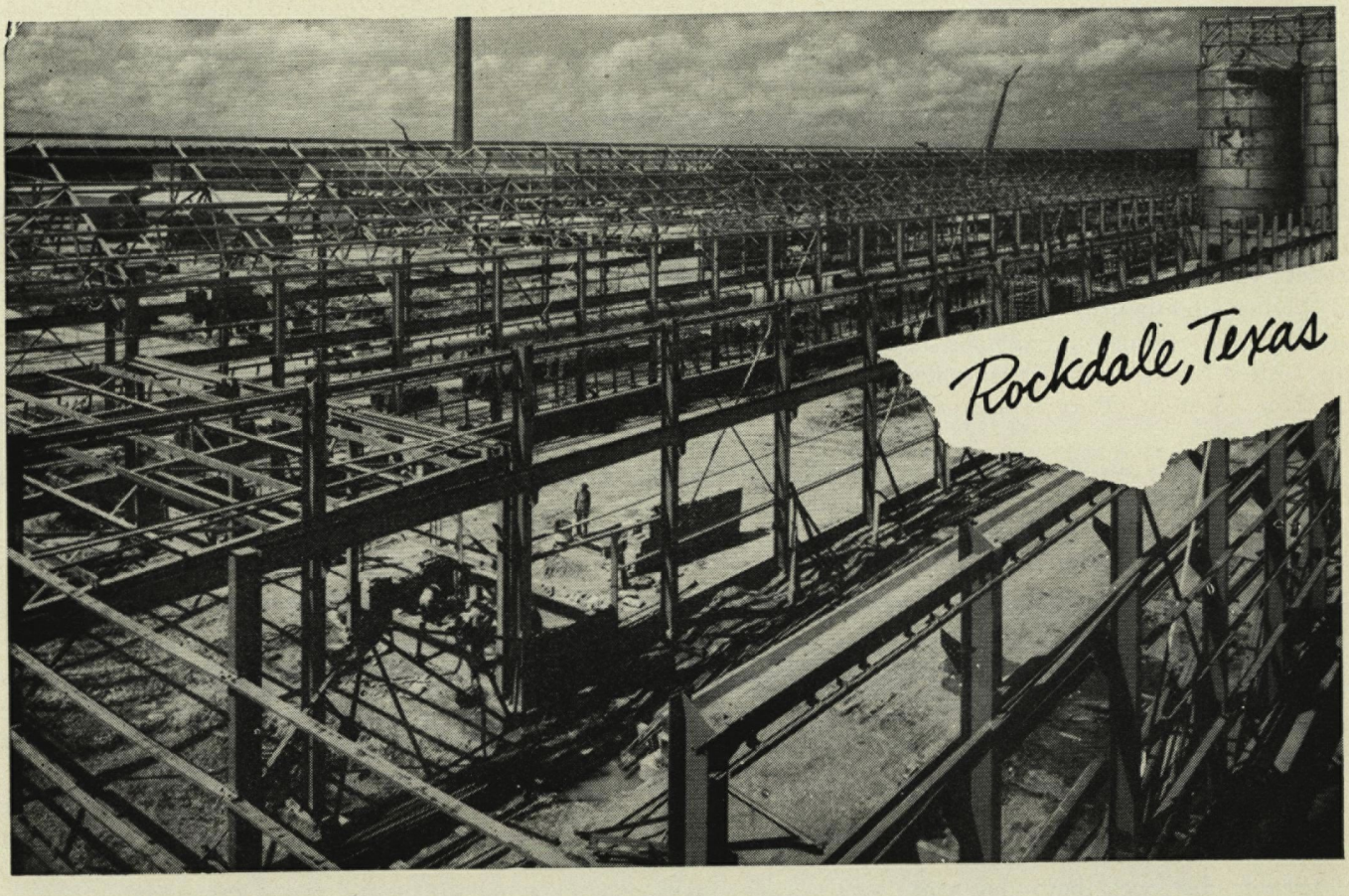
'51 Ray Baker, M.E., has a son Steven Ray, listed as a prospect for enrollment in 1971. Mr. Baker is now employed as a Sales Engineer by R B M Division, Essex Wire Corporation at Logansport, Indiana.

'51 2nd Lt. Fred A. Reynolds, M. E., recently arrived in Korea. He found that he was the third member of the June, 1951, graduating class of Rose in Company B., 839th Engineer Aviation Battalion with the Fifth Air Force. The other two members of the Company were 2nd. Lt. James W. Phillips, M.E., and 2nd Lt. Floyd C. Butel. J. W. Phillips has recently received an assignment for Camp Atterbury.

'52 Second Lt. Richard L. Englum, M.E., of 903 So. Central St., Paris, Ill., recently graduated from the Army's Mountain Training School in Austria.

Ensign Morton W. Hief



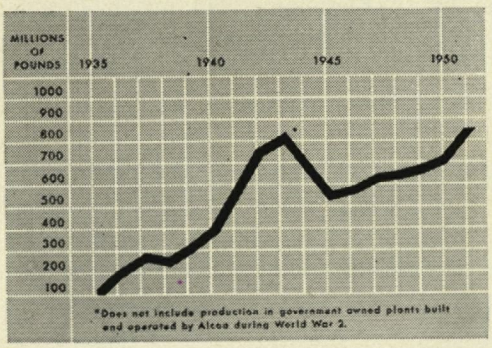


Is part of your future being built here?

Here you see the beginning of another addition to Alcoa's expanding facilities. This plant, at Rockdale, Texas, will be the first in the world to use power generated from lignite fuel and will produce 170 million pounds of aluminum a year. This and other new plants bring Alcoa's production capacity to a billion pounds of aluminum a year, four times as much as we produced in 1939. And still the demand for aluminum products continues to grow. Consider the opportunities for you if you choose to grow with us.

What can this mean as a career for you?

This is a production chart—shows the millions of pounds of aluminum produced by Alcoa each year between 1935 and 1951. Good men did good work to create this record. You can work with these same men, learn from them and qualify yourself for continually developing opportunities. And that production curve is still rising, we're still expanding, and opportunities for young men joining us now are almost limitless.



Ever-expanding Alcoa needs engineers, metallurgists, and technically minded "laymen" for production, research and sales positions. If you graduate soon, if you want to be with a dynamic company that's "going places," get in touch with us. Benefits are many; stability is a matter of proud record; *opportunities are unlimited.*

For more facts, consult your Placement Director.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

Research and Development

Edited by John Sawyers, m.e., jr., and William Cade, fr.

Airliners Simulate Lighthouses To Increase Safety in the Air

"Flying lighthouses" are being adopted by commercial airlines in the United States as the latest move in their constant effort to increase aerial safety.

These lighthouses-in-the-sky are the airliners themselves, many of which henceforth will carry a high-intensity rotating beacon mounted high atop the vertical fin of the tail assembly.

Light source for the beacon is a four and one-half inch diameter lamp of the sealed-beam type, developed especially for this purpose by General Electric. Company spokesmen say the new lamp will indicate an airplane's presence at greater distances, both day and night, than do present standard lights.

The lamp, which produces a light beam of 50,000 candlepower, nearly 50 per cent greater than that of an automobile headlamp, was developed for United Air Lines and the Civil Aeronautics Administration. At least two airlines now are equipping their fleets, and others are expected to adopt this new safety device.

The light source, mounted in a fixture which rotates the beam horizontally, is visible from all points of the compass. A colored glass dome fitted over the lamp and rotating mechanism produces a deep-red beam. The fixture itself was developed by United Air Lines.

Airliner tail showing rotating beacon.

The new beacon light is seen as greatly reducing the danger of two-plane collisions during darkness or other poor-visibility conditions, and making the visibility and identification of planes easier in normal daylight seeing situations.

Modern Lamplighter

Though the lamplighter has long since gone, the problem of turning on the street-lights each evening in a big city remains. It can be done in many ways, such as with high-frequency or carrier current, or photoelectric cells. Some do it by time clocks, and some even manually. None come cheap.

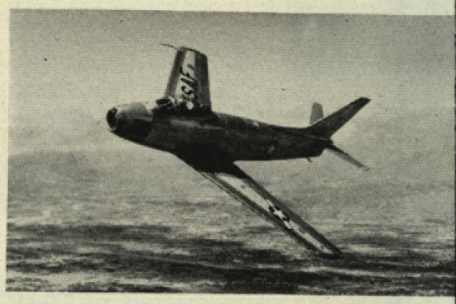
A new type or control built into the constant-current regulator offers possibility of giving a better answer.

Westinghouse engineers, working in cooperation with those of the South Bend Controller Company, have devised an ingenious relay that is made a part of the regulator. With this system, the only human act required to turn on the city's lamps is for an operator at a central point to close a switch. This energizes the nearest regulator, resulting in lighting of the lamps on its "beat." This action, via the relay, energizes the next regulator, and so on chain or cascade fashion throughout the city. The cascade idea is not wholly new, but the incorporation of equipment for accomplishing it as a part of the current-regulator package is and should hasten the adoption of the scheme.

Newest Sabre Jet

A powerful new North American F-86F Sabre Jet is now shooting down MIG's in Korea.

Faster and more deadly than earlier model Sabres, the F-86F is



F-86F Sabre Jet

powered by a General Electric J-47-GE-27 jet engine which gives over 5800 pounds thrust.

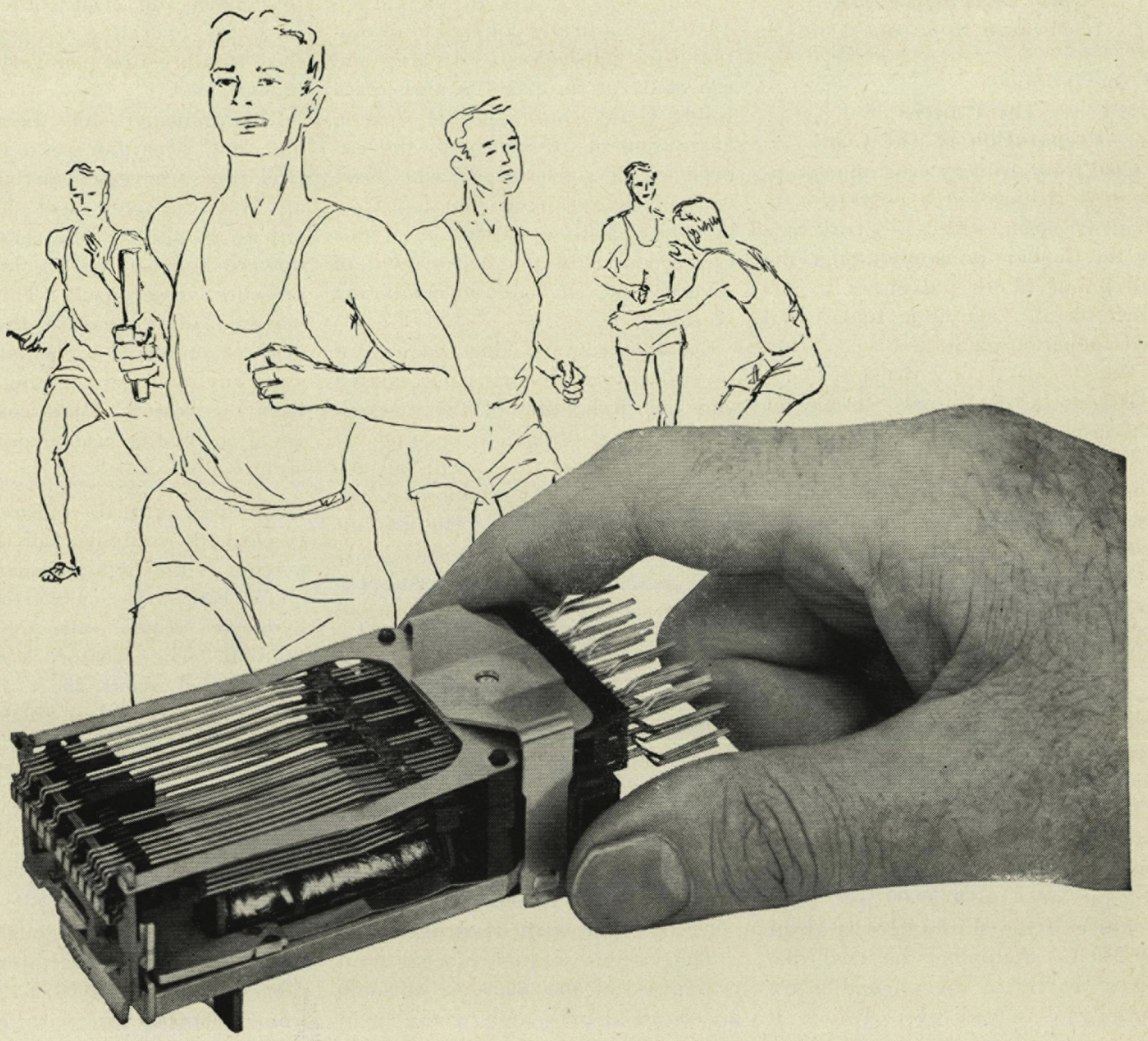
Modification of the Sabre gunsight also has increased the number of aerial victories over the Russian-built MIG.

Improved F-86F Sabre Jets have been coming off production lines in Los Angeles and Columbus, Ohio, since March, 1952. They are in the 650 mph class, have a combat radius in excess of 500 miles and a maximum ceiling of over 45,000 feet.

Corrosion Protection

Oil wells which have been sunk at sea to tap the rich deposits of oil lying under the offshore waters of our Southern states can now stand on firmer foundations. By means of a unique "cover-up" technique, the steel pilings which support the drilling platform are made secure against the destructive effect which sea water has on them, according to the Development and Research Division of The International Nickel Company, Inc.

Engineers seeking to protect the steel pilings against the powerfully corrosive action of sea water, tried many materials and methods without success. The final solution proved simple. The section of the piling subject to greatest attack — the entire splash area from the low water line up to and above the maximum splash area—was merely covered up, by welding on to it a sheet of the highly corrosion-resistant material, Monel, an alloy of nickel and copper.



A NEW RELAY RECORD

RELAYS—which are high-speed switches—are the nerve centers of the dial telephone system. In a split second, they set up a connection and then are off to direct the next call. In a large city, more than 1000 relays are used every time a number is dialed.

Now a new wire spring relay—devised by the Bell Laboratories—is at work. With only 11 instead of 70 parts, it is twice as fast, uses less power, and costs less to make and maintain than its predecessor. Result: calls go through faster and switching is done with less equipment.

Men and women of the Bell System—in operating, manufacturing and laboratory work—continually seek new ways to improve telephone service. Qualified engineering graduates can find well-paid and interesting careers in the telephone business. Your placement officer can give you details about opportunities for employment in the Bell System.

BELL TELEPHONE SYSTEM

Coal Hydrogenation

(*Continued from page* 11)

of the products.

The Process: Preparation of the Coal

Coal from primary crushing equipment is reduced in a pulverizer to about 20 mesh, which is satisfactory for the Carbide process although the Bureau of Mines pulverizes to 200 mesh for its "synthetic fuels" coal hydrogenation plant.

The 20-mesh coal is dried at about 125°C in a continuous stream of hot gases from a producer burning natural gas or methane. The combustion is regulated so that the gases contain less than 1% 0_2. Moisture-free coal minimizes troublesome side-reactions that water might cause in the hydrogenator.

Pulverized coal is then fed continuously into the oil slurry or paste-mixing system. The paste is made up of 25-40% coal mixed with a highly aromatic oil recovered and recycled from the high-pressure converter.

The coal paste is pumped to the hydrogenation area by several steam-driven, double-action piston pumps at a pressure up to 6000 psi. Temperature of the slurry here is about 150-250°C. Actually, the coal dissolves readily in the oil and is essentially dissolved even before it reaches the hydrogenator. This is probably explained by the fact that bituminous coal is not carbon (as commonly believed, but a macromolecule hydro-carbon.

Ash (8-15%) and fusain carbon (8-15%) naturally don't go into solution. In high-velocity streams and especially at the paste pumps, these solids could cause serious erosion of equipment. Contrary to the experience of some others who have worked on coal hydrogenation, Carbide has had few difficulties of this type because of the background of several UCC divisions in combating erosion.

Catalyst can be added at any of several points between paste mixing and the preheating of the oil-coal-hydrogen solution. Any one of several types can be used, but it's doubtful whether Carbide uses the conventional iron type. The amount of catalyst added also varies: 0.1-0.5% is the usual range at present—in contrast to 4-5% catalyst required by most German-based processes. Since the amount of catalyst is so small and costs so little, Carbide engineers don't even bother to recover it. They insist that they can operate the process just about as well without any catalyst and suggest that it might well be dispensed with altogether in a large commercial unit.

The Process: Reaction with Hydrogen

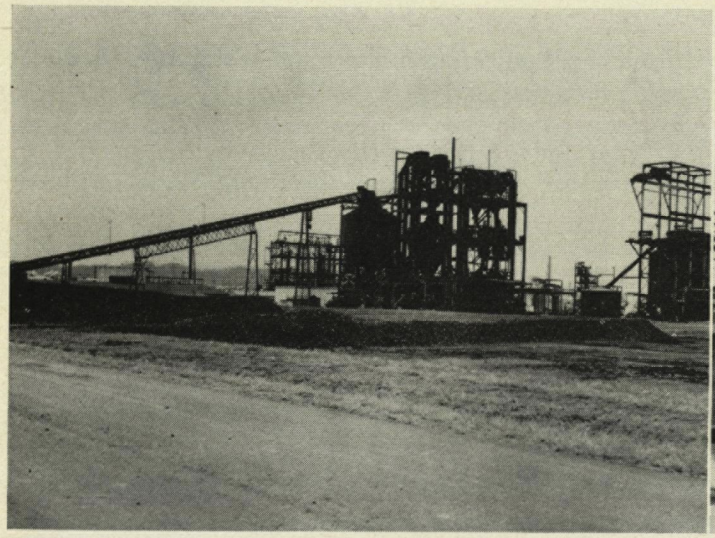
The viscous solution of coal-in-oil is pumped at 4000-6000 psi. through an electrical preheater, where high-pressure hydrogen—recycle or make-up—is also fed into it. Since the hydrogenation reaction is exothermic, this preheater is essential only for start-up periods. It can also be used to balance out heat content or to raise the operating temperature in the high-pressure converter to a higher level.

This preheater—like the converter and "hot" separator—is a steel, vertical pressure vessel surrounded by an 18-ft. diameter steel shield. Air enters at the bottom and surges upward between the shield and the pressure vessel itself. This is primarily a safety measure; the upward draft of air would immediately flush away any hydrogen that might escape from the vessels. Some coal hydrogenation plants use massive concrete walls instead.

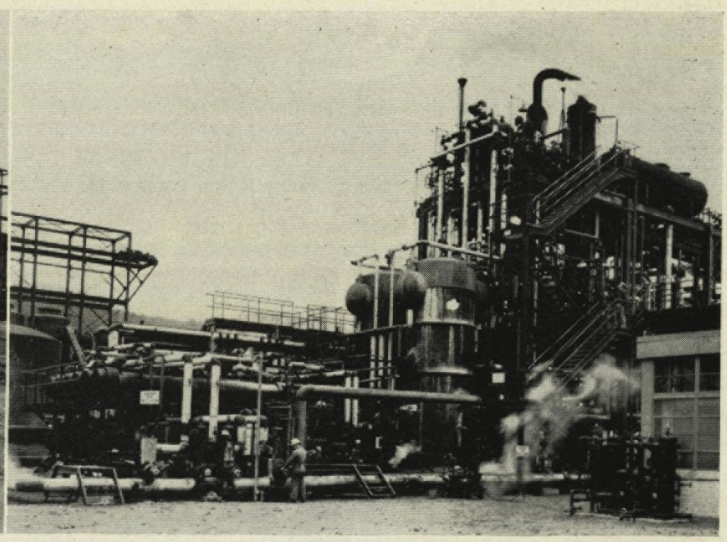
The most critical—and most secrecy-cloaked—equipment of the entire process is the high-pressure, liquid-phase continuous converter where hydrogen reacts with the coal-oil solution. The reactor is a forged steel vessel about 35 ft. high and 30 in. i.d. Its 7½-in.-thick wall is made of a specially modified 6130 Cr-Mo-V steel with the chromium content raised to give greater resistance to hydrogen embrittlement. It also has a refractory lining.

Feed material—coal, oil, and hydrogen—all flow up through the reactor. Operating temperature usually ranges from 840-1000°F, pressure from 4000-6000 psi with residence time from 3-4½ min. (German-based processes require about 45 min.) Whether these are the best operating conditions is not yet known. Pro-

(*Continued on page* 24)



Coal handling building



Pitch Still

Things are different—up there!

You would be amazed at the tricks nature plays in the stratosphere

As aviation progress has carried man farther into the upper air, he has found that nature has many tricks up her sleeve in the stratosphere. Many things that worked well on the ground wouldn't do as well, or failed completely, in the space beyond the clouds. Things are truly different up there.

CARBON BRUSHES ARE AN EXAMPLE—These brushes are the contact points that carry electricity between moving and stationary parts of motors and generators. They're in electric razors, sewing machines, huge diesel locomotives—and in modern aircraft.

THEY COULDN'T STAND ALTITUDE—Today's high-flying planes require literally hundreds of small electric motors and many carbon brushes. Here was one of nature's quirks, for brushes which worked well on the ground and at lower altitudes couldn't take the thin, dry air of the stratosphere. They'd spark and quickly disintegrate. And if the brushes failed, the motors also would fail.

UCC FOUND THE ANSWER—The people of Union Carbide attacked this problem. Through research they developed special carbon brushes that worked uniformly well at all altitudes, making stratosphere flying a practical reality.

OTHER AIDS TO FLYING—Better carbon brushes that keep motors and generators running, alloy metals that stand the terrific heat of jet engines, plastic insulation for high-altitude wiring, and oxygen that provides the breath of life in the upper air—these are but a few of the many UCC products that are helping aviation reach new heights.

STUDENTS and STUDENT ADVISERS: *Learn more about the many fields in which Union Carbide offers career opportunities. Write for the free illustrated booklet "Products and Processes" which describes the various activities of UCC in the fields of* ALLOYS, CARBONS, CHEMICALS, GASES, *and* PLASTICS. *Ask for booklet C-2.*

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UCC's Trade-marked Products of Alloys, Carbons, Chemicals, Gases, and Plastics include

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ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys • PREST-O-LITE Acetylene • PYROFAX Gas
DYNEL Textile Fibers • BAKELITE, KRENE, and VINYLITE Plastics • LINDE Oxygen • SYNTHETIC ORGANIC CHEMICALS

(*Continued from page 22*)

bably a number of sets of "best" conditions will be dictated by the types and relative proportions of products to be made. Product flexibility capable of meeting variations in the market demand of the various products is an important economic advantage of Carbide's process.

In addition to Carbide's success in combating erosion, they have been able to minimize the effects of another problem which plagues most producers of aromatics — coking-up of the equipment. The principal factors which contribute to this coke-free operation are (1) low residence time; (2) high hydrogen vapor pressure—300-400% excess hydrogen is added to the coal-oil solution; and (3) the absence of void spaces in the reactor.

The Process:
Separation of the Products

The reaction mixture leaves the top of the converter and goes into a similar high-pressure vessel called the "hot" separator. Here the liquid and vapor streams are separated, after which the pressure of the liquid stream is reduced. Liquid product from the hot separator contains the extremely high-boiling oils, ash, fusain carbon and any unreacted coal. These latter—as finely divided solids are taken out of the oil by a solids separation process. Several ways to do this are, or will be tried out: centrifuging, filtration, and flash vaporization. The problem has always been a difficult one in all coal hydrogenation processes and is one which Carbide has not yet solved to its own satisfaction. These solids (normally about 15-30% of the coal feed) will probably find a market as a cheap filler material.

High-boiling oils from this liquid stream go to a recycle oil still. Here the pitch-like material is separated from the aromatic coal-dissolving oil; part of the oil is recycled to the paste mixing operation, the most volatile part is used as a wash to purge the remaining heavy oil in the solids separation step.

The pitch will probably be used to make high-quality graphite electrodes; hence it could almost be looked upon as a premium product. The output of pitch depends upon the operating conditions and varies inversely with the realtive amount of hydrogen used. With no pitch, hydrogen consumption goes too high for sound economics.

Again considering the "hot" separator, the vapor stream passes through the coils of a water-spray heat exchanger and into the "cold" separator. In this small, horizontal vessel—essentially a still—the product stream is again split into gas-phase and liquid-phase streams. Most of the gases (largely H_2 with some NH_3, H_2S, and CH_4-to-C_4H_{10} hydrocarbons) at present are sent to a hydrogen compressor for recycle to the process. Some 75% of the hydrogen in the plant's present hydrogen cycle comes from these gases, but in a commercial plant they could be separated and purified or used as chemical raw materials.

The liquid stream from the "cold" separator contains the products for which Carbide's plant was primarily designed. This stream includes toluol, xylol, naphthalene, methyl naphthalenes, and higher hydrocarbons; cresols, xylenols, phenol and higher monohydric phenols; aniline, toluidines, xylidines, quinolines, indole, and other higher-boiling nitrogen-containing chemicals.

This chemicals separation plant is conventional in that it uses the usual unit operations of distillation, fractionation, and solvent extraction. It is complicated because of the variety, complexity, and number of chemical products involved.

At least half of Carbide's eleven million dollar investment at the Institute hydrogenation plant was spent for this chemicals separation area. Although most of the units are built of mild steel, the best material for many of the operations remains to be determined.

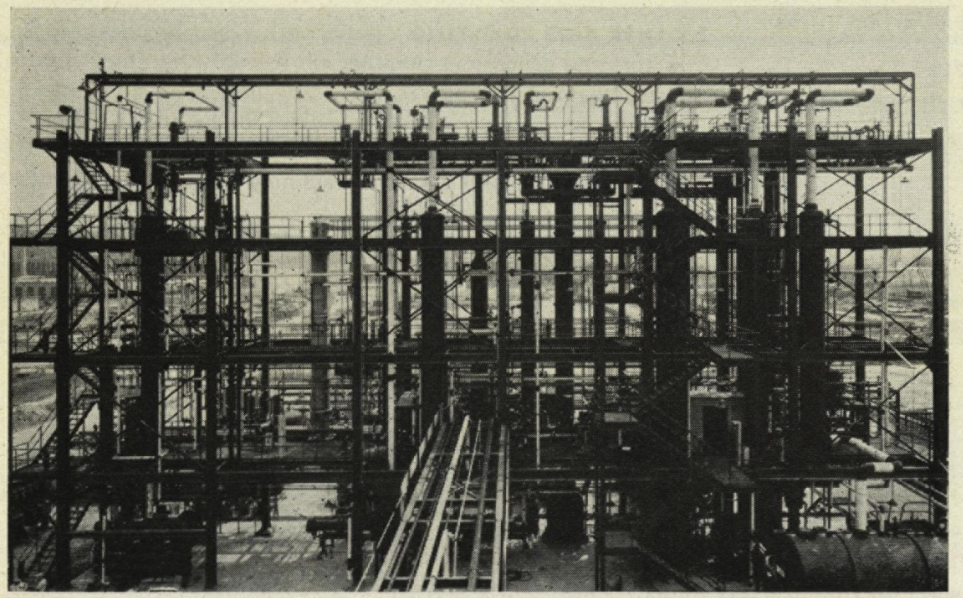
In the light hydrocarbons separation building the aromatic stream is first broken into three principal fractions by chemical reaction and solvent extraction: (1) a hydrocarbon portion; (2) a phenolic portion; and (3) an aryl amine and nitrogen heterocyclic portion.

Hydrocarbons are separated by distillation into various products. One of these—naphthalene—is purified by crystalization.

The phenolic portion is separated by continuous distillation into two fractions; one contains the high-boiling phenols while the other is made up of phenol, cresols, xylenols, and cresylic acid. According to present plans, each portion will later be fractionated and refined into individual chemicals of commerce.

Crude hydrocarbon fractions can

(*Concluded on page 26*)



The Chemicals separation unit

Developed by RCA Victor, the new "45 Extended Play" record gives music lovers more music for less money plus a perfect medium for playing shorter classical works and multiple popular selections.

Twice as much music on the same size record

Another RCA achievement in electronics:

A challenging question was asked RCA engineers and scientists in 1951. How can we increase the playing time of a 7-inch "45" record, *without using a larger disc?*

Sixteen months of research gave the answer, "45 EP"—Extended Play. Public response confirmed this as *the most important achievement in the new recording speeds.* More than 2 million RCA Victor "45 EP" records were bought in the first four months of their existence!

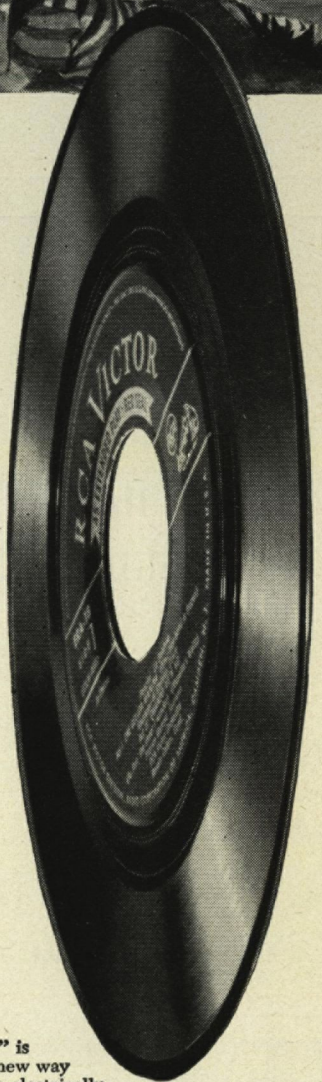
Research leadership—your guide to better value: the ability of RCA Victor to solve the problem of more music on a "45 Extended Play" record accents the importance of research *to you.* Whether you plan to buy television, radio or any other electronic instrument, research leadership adds more value to all products and services trademarked RCA or RCA Victor.

CONTINUE YOUR EDUCATION WITH PAY—AT RCA

Graduate Electrical Engineers: RCA Victor—one of the world's foremost manufacturers of radio and electronic products—offers you opportunity to gain valuable, well-rounded training and experience at a good salary with opportunities for advancement. Here are only five of the many projects which offer unusual promise:

- Development and design of radio receivers (including broadcast, short-wave and FM circuits, television, and phonograph combinations).
- Advanced development and design of AM and FM broadcast transmitters, R-F induction heating, mobile communications equipment, relay systems.
- Design of component parts such as coils, loudspeakers, capacitors.
- Development and design of new recording and producing methods.
- Design of receiving, power, cathode ray, gas and photo tubes.

Write today to College Relations Division, RCA Victor, Camden, New Jersey. **Also many opportunities for Mechanical and Chemical Engineers and Physicists.**



Secret of "45 Extended Play" is RCA Victor's discovery of a new way to cut a master disc—with an electrically heated stylus. Grooves are closer. Sound quality is cleaner, clearer, more alive.

RCA® *RADIO CORPORATION OF AMERICA*

World leader in radio—first in television

Coal Hydrogenation

(*Concluded from page 24*)

be refined into specification-grade aromatic solvents and other products. The nitrogen compounds portion is separated by batch distillation to yield aniline, toluidine, xylidines, quinoines, and other products.

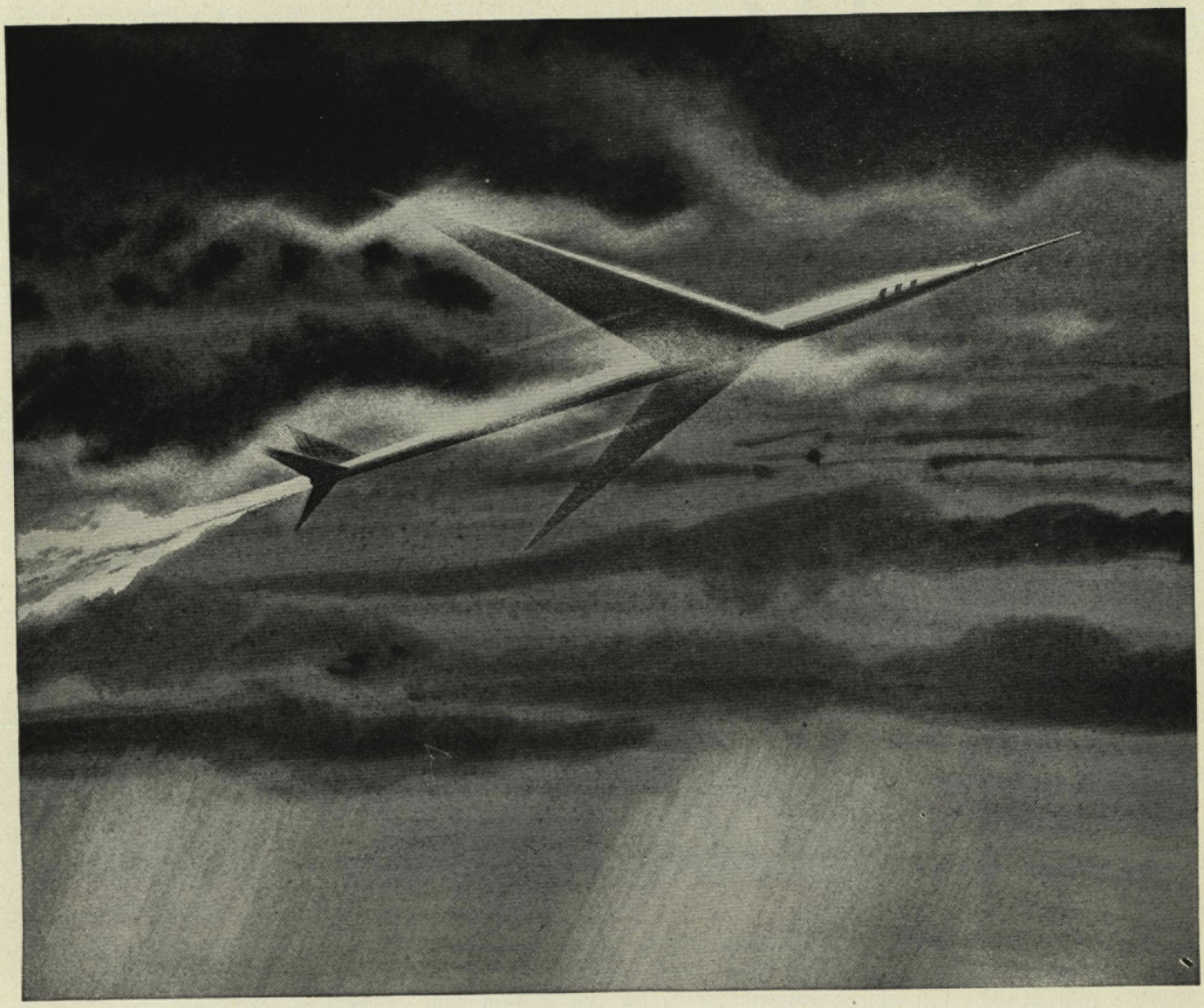
The Products

Carbide sees the big potential in the products of coal hydrogenation as potential building blocks for syntheses of new complex organic molecules. Certainly large quantities of the familiar aromatic solvents phenol, benzene, xylene, for example, will be shipped from any hydrogenation plant. The big unit price items, however, are going to be the more complex compounds either not now available from coal or available in very small quantities. Quinoine, used in the sythesis of nicotinic acid, is a good example. The supply now available from coal is inadequate and the material is being made synthetically. Coal hydrogenation could make plenty of it.

In addition to the direct products of the process, Carbide is anticipating a large family of secondary derivatives. With a large, cheap supply of aromatic components readily available, they look forward to the development of alkylaryl compounds at prices that should give them broad industrial applications.

The Future

From now on, the development of coal hydrogenation at Carbide will be an integration of application research in the laboratories, market analysis by the sales staff, and experimentation with process variables at Institute. The production department will work to find out what compounds can be produced in significant quantities by the plant and the effect of varying conditions on relative yields. The research department will then try to find out how these products can be isolated and refined and, more important, what they can be used for. And the sales department will try to find out how much of any product can be sold at what price. Ω



Do you want to get ahead in engineering?

Then—after you graduate—join a company that's expanding in fields where big engineering futures lie.

At Boeing you'll find plenty of room to get ahead in such projects-with-a-future as a major guided missile program . . . research in supersonic flight and nuclear-powered aircraft . . . America's first-announced jet transport . . . and the revolutionary B-47 and B-52 jet bombers.

You'll find Boeing a stable 36-year-old company, that has grown practically continuously. For example, Boeing now employs 6000 engineers in contrast to 3500 at the peak of World War II. And although Boeing is a large concern, it is so organized that each engineer is an individual who stands out—and progresses—in proportion to his ability.

Boeing is constantly alert to new techniques and materials — and approaches them without limitations. Extensive subcontracting and major procurement programs — directed and controlled by engineers—give you a varied experience and broad contacts with a cross section of American industry. No industry, in fact, matches aviation in offering such a wide range of experience, or breadth of application — from pure research to production design, all going on at once.

Boeing engineering activity is concentrated at Seattle in the Pacific Northwest, and Wichita in the Midwest. These communities offer fishing, hunting, golf, boating and other recreational facilities. Both are fresh, modern cities with fine residential and shopping districts, and schools of higher learning where you can study for advanced degrees.

There are openings in ALL branches of engineering (mechanical, civil, electrical, aeronautical, and related fields), for **DESIGN, DEVELOPMENT, PRODUCTION, RESEARCH and TOOLING.** Also for servomechanism and electronics designers and analysts, and physicists and mathematicians with advanced degrees.

For further information, consult your Placement Office, or write:

JOHN C. SANDERS, Staff Engineer—Personnel
Boeing Airplane Company, Seattle 14, Washington

BOEING

UHF TV

By Don McCune, e.e., jr.

The lifting of the freeze on new television stations in April of 1952 will mean better and more widespread television service. But why, in 1948, did the Federal Communications Commission (FCC) place a freeze on station construction?

At the time of the freeze, only 109 stations were in operation on what is known as Very High Frequencies (VHF), but already the FCC knew that if the then present rate of station construction was continued, interstation interference could be expected. What is the answer? The FCC decided to arrange the station frequencies in a better pattern so that more permits could be issued and still not cause interference. This made possible 450 more stations. When all of these are on the air, the VHF band will be about full, then what?

During the freeze, the FCC issued licenses to several companies to experiment with Ultra High Frequencies (UHF). One such station was KC2XAK in Bridgeport, Connecticut, operation on an assigned frequency of 529-535 megacycles. KC2-XKA was locted on top a hill which was later known as "Success Hill."

Meanwhile, UHF receivers and converters for existing VHF receivers were placed in homes of the people of Bridgeport. Daily records on the performance of these sets were kept.

On January 11, 1950, KC2XAK began transmitting daily test patterns. Later, the signal was regular television programs from WNBT in New York. The signal came from a 2000 megacycle microwave unit on the 85th floor of the Empire State Building. The signal was received, amplified, and rebroadcasted on KC2XAK's own frequency. The radiated power was 14 kw from a high-gain, slot-type antenna.

All of the data taken by KC2XAK was given to the FCC who made it available to all manufacturers and broadcasters. After studying the data, the FCC decided to open up 70 new television channels, which would provide space for 1,357 UHF stations. This would increase to more than 2000 the number of stations all over the United States.

Several conclusions were made from the information made available. A station can go on the air with a kw transmitter and should radiate between 16 to 20 kw effective radiated power (erp). This signal could be received as class A for a 14 mile radius and class B for a 23 mile radius.

The distance will be increased in flat areas and decreased in hilly areas. The distance varies with antenna height but the figures above represent a rough guide.

The range of UHF coverage can be extended by increased power. The FCC has permitted UHF stations to go as high as 1000 kw erp. Better reception will also come when better UHF tuners, converters, antennas, and transmission lines have been developed.

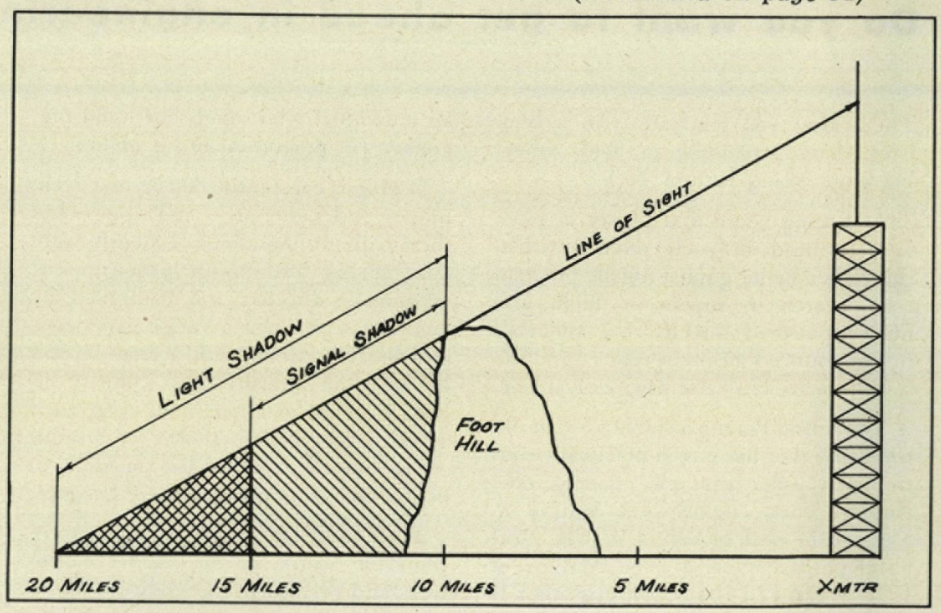
At the present time, there are no known tuners on the market that will tune both UHF and VHF. A standard VHF receiver can be modified in two ways to receive UHF. The device most commonly used is a converter. A UHF antenna feeds a signal to the converter which feeds a VHF signal into the receiver. The converter method is capable of producing satisfactory pictures and is reasonable in price, usually costing about $40.

The second method used deals with modifications to the VHF tuner. If the receiver is not expected to be used on a particular VHF channel, the coils for that channel can be replaced by those for a UHF channel that can be received. This method has the following disadvantages:

(1) if all channels are in use, no channel can be removed (2) one may not know if a particular channel will ever be used (3) although the cost of a coil strip is about half the price of a converter, if several UHF stations are within range, the conversion would be more expensive.

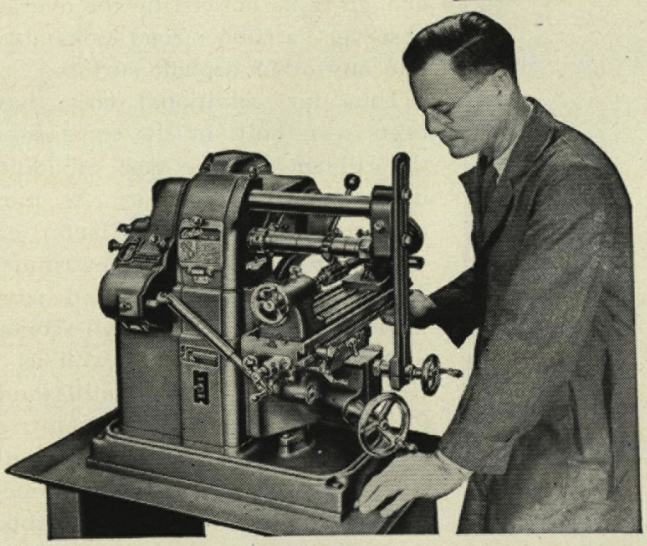
Now for some attention to one of the most important links in the system, the antenna. In general, the double Vee has given the best performance. For best reception for VHF, the Vee elements should be

(*Concluded on page* 34)



Signal shadow resulting from U.H.F. transmission is approximately half of corresponding light shadow.

Another page for **YOUR BEARING NOTEBOOK**

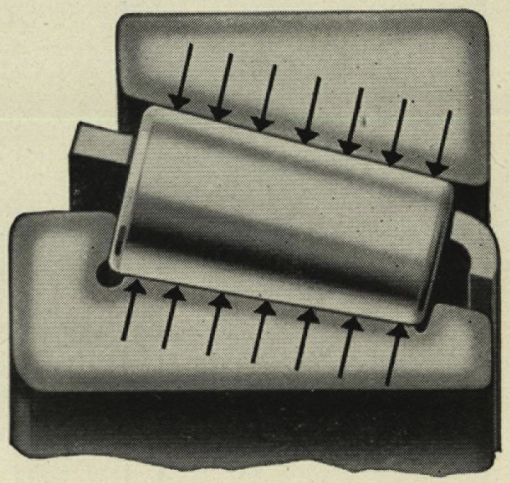


How to give an 8-speed miller greater spindle accuracy

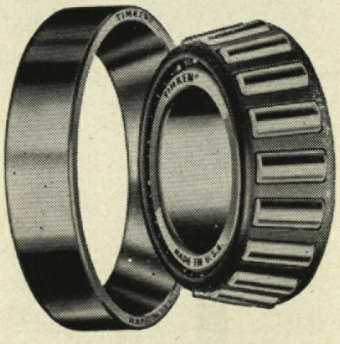
This milling machine has 8 speeds, from 62 to 2870 RPM. To hold the spindle in accurate alignment at these various speeds, design engineers mount it on Timken® precision bearings. Long-lasting milling precision is assured. Spindle accuracy can be controlled because Timken bearings are adjustable. And they provide more than enough capacity for any tool load.

Line contact of TIMKEN® bearings keeps spindles rigid

Because Timken bearings carry the load along the line of contact between rollers and races, they give a wider, more rigid support to the shaft. And the tapered construction of Timken bearings enables them to take radial and thrust loads in any combination. End-play and deflection in the shaft are practically eliminated.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

Some of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken Bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭
BEARING TAKES RADIAL ⓪ AND THRUST →⓪← LOADS OR ANY COMBINATION ✳

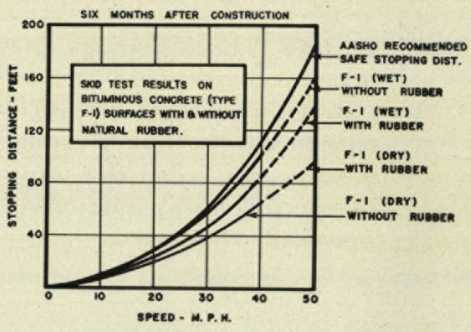
Rubber Roads

(*Concluded from page* 12)

enough to be noticed by the average observer—a rubber road looks about like any other asphalt surface.

Thus far, additional costs have been seen only in the expense of the rubber and the cost of adding it to the asphalt mixes. As more tests are evaluated this factor can be more accurately determined. Tests have been made and pavements laid in practically all sections of the United States, as well as in Great Britain, The Netherlands, Canada, and other foreign countries.

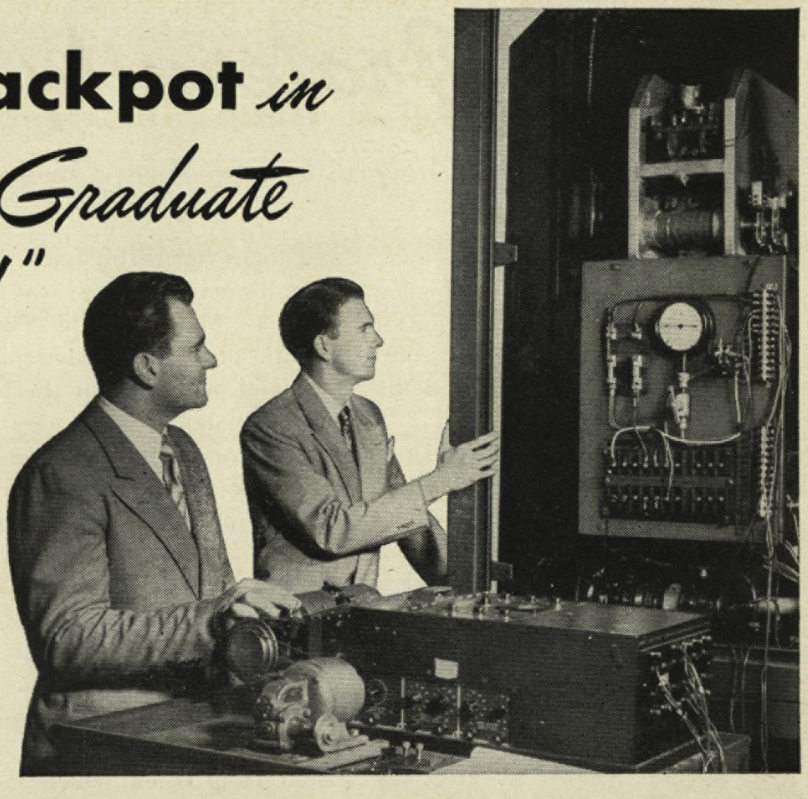
Some other characteristics of rubber roads should also be mentioned. The formation of ice on rubber pavement seems to proceed more slowly than on plain asphalt. Perhaps this is due to the lesser degree



of surface water penetration of rubber-asphalt than ordinary asphalt. Traffic noise is also cut down. Having been known for years as a material having a high friction coefficient, rubber (in roads) is known to reduce the distance needed for safe stops at various speeds. In addition, the claim has been made that rubber-asphalt surfaces are more resistant to the collection of dust.

Use of rubber with asphalt paving mixes need not be confined to highways alone. Conceivably enough, sidewalks and playgrounds, and other areas where asphalt surfaces are used could be covered with this new surface and result in lower upkeep costs for years to come. Ω

"We Hit the Jackpot *in* Allis-Chalmers Graduate Training Course!"



say N. W. MORELLI

Oregon State College, B.S.,M.E.—1950

and

E. R. PERRY

Texas A. & M., B.S.,E.E.—1950

WHILE taking the course, two engineers developed a revolutionary new circuit breaker mechanism.

"Our experience shows what *can* happen if you work with people open to suggestion. We found men of this kind at Allis-Chalmers, and it has given us a special pleasure in our job.

"We started out like most other graduates with a hazy idea of what we wanted to do. After working in several departments, we requested that part of our training be at the Boston Works of Allis-Chalmers, where circuit breakers are made."

New Design Principle

"Circuit breakers soon became an obsession with us, and we got the idea of designing a hydraulic operator and triggering mechanism for these breakers. Most operators for big breakers are pneumatic.

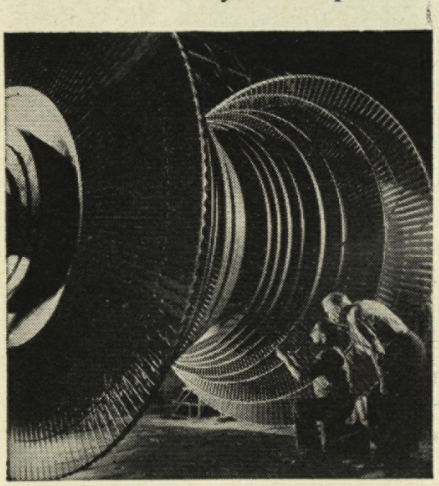
"Unsuccessful attempts had been made in the past by all circuit breaker manufacturers to build hydraulic operators. The important thing is that no one at Allis-Chalmers said, 'Don't try it—it won't work.' "

Start New Era

"To make a long story short, our study of the problem led us to the hydraulic accumulator and high speed valves being used by the aircraft industry. These had not been available when earlier attempts were made to build a hydraulic operator. With these highly developed devices to work with, we were able to build an operator that combined the best features of pneumatic and hydraulic operation. We call it the *Pneu-draulic* operator. Engineers are saying it starts a new era in circuit breaker actuation.

"This fact is important to us, but it is even more important to know that Allis-Chalmers Graduate Training Course is full of opportunity . . . and as we found out, there's opportunity right from the start."

Pneu-draulic is an Allis-Chalmers Trademark.



Low-pressure spindle for a 120,000 kw steam turbine generator. Said to be one of the largest ever built in the United States, this spindle is nearing completion in the Allis-Chalmers West Allis shops.

Facts You Should Know About the Allis-Chalmers Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training.

3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, or specialized equipment with which he will work, such as: steam or hydraulic turbo-generators, circuit breakers, unit substations, transformers, motors, control, pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

5. He will have individual attention and guidance in working out his training program.

6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

7. For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

C-5675

Fraternity Notes

By John Gregory, George Ross, Owen March, and Jack Niemi

Sigma Nu

A recent meeting of Beta Upsilon completed the annual installation of new officers as former eminent commander, Robert Ray, conducted the ceremony.

Those elected to office were: Donald Wood, eminent commander; Carl North, lieutenant commander; Richard Matthews, recorder; Owen Meharg, treasurer; James Tatooles, assistant treasurer; Owen March, reporter; Donald Fyfe, chaplain; Richard Green, alumni contact; Robert Mogle, marshall; William Boring, sentinel.

The chapter wishes to give acknowledgment to Robert Ray and other officers that are bowing out of duty. Their splendid leadership has made all activities, both social and academic, a complete success.

Beta Upsilon has recently pledged ten worthy men. They are: Phil Boller, Lloyd Bowman, Stanley Carpenter, Myron Clark, John Fidinger, Don Fordyce, Charles Hartley, Don Ittel, Joe Leppert, and Art Sutton. They join the pledge class now under the able guidance of pledge-master Duray Potter.

It is quite easy to tell that spring is here. With the advent of warmer weather more Sigma Nu pins have been surrendered.
Simpson pinned Miss Elsie Workman of Terre Haute; and Gurdon Huntington pinned Miss Jeanne Johanningsmeier of Carlisle, Indiana.

Further congratulations are in order for pledge Dick Matheis and his bride, the former Miss Jerry Schiller of Haysville, Indiana.

Alpha Tau Omega

A picnic which had been postponed from the preceding Sunday because of rain was held at Turkey Run State Park on Sunday, May 3 by Alpha Tau Omega. The day's activities included softball, hikes on the trails, and logic stories by Lafe.

A dinner meeting was held on Tuesday, May 5, by the Vigo county alumni of Gamma Gamma to discuss and lay plans for the fund raising campaign for the new house to be built on campus. A brochure and letter of explanation have been drawn up to be sent to the alumni.

April 16 marked the passing on of another Alpha Tau when Harry Harris pinned Miss Genevieve Hasse, a freshman at State, who is a native of Elkhart, Ind.

Formal initiation for eight men was held on May 24 following the usual Help-Week which included a variety of games and the traditional concluding road hike.

Lambda Chi Alpha

Lamda Chi Alpha recently held an election of officers. The newly elected officers are as follows: John Freely, President; Dick Gordon, Vice-President; Jim McCullough, Secretary; Dave Hackett, Treasurer; Ron Smith, Social Chairman; Bud Teague, Rush Chairman; Bill Lamb, Ritualist; and Jack Hughes, Pledge Trainer. Wayne Mason recently relieved Jack Farell of the House Manager's duties.

Congratulations are extended to John Melin who recently pledged Lambda Chi.

Recently the Inter-Fraternity Basketball League was begun. The first game pitted Lambda Chi against the Alpha Tau Omega's. The game was a hard fought battle the first half with the "Chi's" out in front by a slim 21 to 17 count. The boys really poured it on the second half and Lambda Chi defeated the ATO's by a 58 to 30 score. The large victory margin was accredited to the ball-hawking of Jim Jewell and Bob Young. They teamed with Ralph Lockhart, Jack Farell, Bob Barton, Ron Runyun, George Ross, Harvey Greene and Howie Pedigo. The squad is coached by two Rose Poly Basketball greats, namely Dick Gordon and Don Snape.

Next on our list was a mighty Sigma Nu team. After the boys had piled up a ten point lead at the quarter and held an eight point margin at the half, Sigma Nu got "hot" and narrowed the margin considerably in the third quarter. The last quarter was a nip and tuck affair with Lambda Chi coming out on top by a 41 to 39 count. That was close, brother.

Lambda Chi's last basketball game will pit them against the Theta Xi Fraternity. The game promises to be an interesting one. We wish our boys good luck in their last tilt and hope they bring home the Inter-fraternity-Basketball championship and the trophy that goes with it.

Theta Xi

The hive at 1701 Chestnut has really been buzzing lately. First, there was the open-house after the St. Pat's Dance during which "Fuzzy-Wuzzy" Sovereign and "Most Unusual" Ulbrick again became objects of tonsorial splendor.

Next, the open-house after the Junior Prom found a red-hot game of Charades going. No William Tell Overture was allowed. A Sunday picnic at Shakamak, the day after the Prom was greeted by Old Man Winter, but a hearty fire and a hearty ball game kept all the picnickers happy.

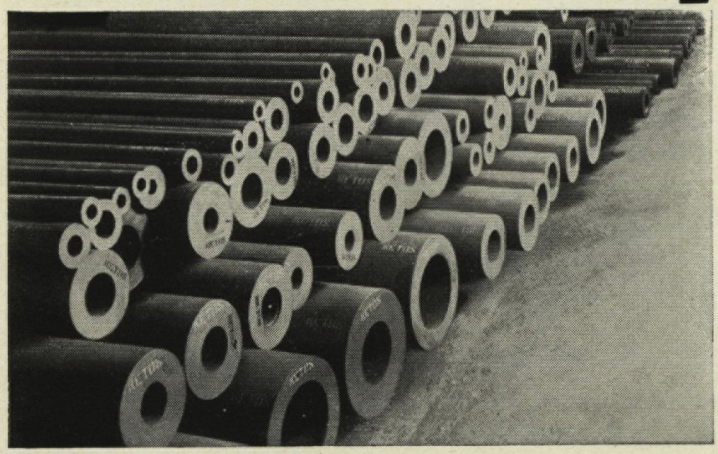
All the actives went over to Indianapolis for the alumni celebration of 6294 Day there this year. This was a trip most enjoyed by all, especially the bumps and the grinds.

To round out the year, the initiation of the pledges is coming up. The party which pledges are to give the actives promises to be one of the best ever, and all the pledges are anxious for initiation to come.

What's Happening at CRUCIBLE

about hollow tool steel

Crucible is now making its high quality tool steel available in hollow form. Bars of Crucible Hollow Tool Steel can now be obtained with machine finished inside and outside diameters and faces — in three famous grades: KETOS, AIRDI 150 and SANDERSON. Already its use has effected substantial savings for makers of tool steel parts with cutout centers.



typical applications

The ring shaped tools that can be fabricated from hollow tool steel are virtually limitless — beading rolls, bearings and bushings, blanking and briquetting dies, cam dies and followers, chuck jaws, circular knives and shears, cutters, die holders and inserts, engraver and edging rolls, extrusion dies, feed and flue rollers, forming rolls, nozzles, saws, sleeves, slitters, stamping dies, wheels . . . and many others.

how it cuts costs

Crucible Hollow Tool Steel permits a toolmaker to bypass drilling, boring, cutting off and rough facing operations. Naturally, this results in less production time per unit, greater machine capacity, and a reduction in scrap losses. In some cases material costs alone are cut 20% by the use of Crucible Hollow Tool Steel instead of regular bar stock.

availability

All grades and sizes of Crucible Hollow Tool Steel are carried in stock in Crucible warehouses conveniently located throughout the country.

CRUCIBLE HOLLOW TOOL STEEL

Sizes (inches)	GRADES		
	Sanderson	Ketos	Airdi 150
2 O.D. x 1 I.D.	x	x	
2½ O.D. x 1½ I.D.		x	
3 O.D. x 1½ I.D.		x	
3¼ O.D. x 1¼ I.D.	x	x	x
3¼ O.D. x 1½ I.D.		x	
3½ O.D. x 1½ I.D.	x		
3½ O.D. x 2 I.D.	x	x	x
4 O.D. x 1½ I.D.			x
4 O.D. x 2 I.D.		x	x
4¼ O.D. x 1¾ I.D.			x
4½ O.D. x 2 I.D.	x		x
5 O.D. x 2 I.D.	x	x	x
5 O.D. x 2½ I.D.		x	x
5 O.D. x 3 I.D.	x	x	
5½ O.D. x 1¾ I.D.			x
5½ O.D. x 2 I.D.		x	
5½ O.D. x 2½ I.D.	x		x
6 O.D. x 1¾ I.D.			x
6 O.D. x 2 I.D.		x	
6 O.D. x 3 I.D.	x	x	x
6½ O.D. x 3¼ I.D.			x
6½ O.D. x 3½ I.D.		x	
6½ O.D. x 4 I.D.			x
7 O.D. x 2¼ I.D.			x
7 O.D. x 3 I.D.	x	x	
7 O.D. x 3½ I.D.			x
7 O.D. x 4 I.D.	x	x	
7½ O.D. x 3 I.D.	x	x	
7½ O.D. x 3½ I.D.	x	x	
7½ O.D. x 4 I.D.			x
8 O.D. x 3½ I.D.	x	x	
8 O.D. x 5 I.D.	x	x	x
8¼ O.D. x 3½ I.D.			x
8½ O.D. x 5¼ I.D.	x	x	x
9 O.D. x 4 I.D.	x	x	
9 O.D. x 5 I.D.		x	x
9 O.D. x 6 I.D.	x		
10 O.D. x 4 I.D.		x	
10 O.D. x 5 I.D.	x	x	
10 O.D. x 6 I.D.	x	x	x
11 O.D. x 4 I.D.	x	x	
11 O.D. x 6 O.D.	x	x	
11 O.D. x 7 I.D.		x	x
12 O.D. x 5 I.D.	x	x	x
12 O.D. x 6 I.D.	x	x	
12 O.D. x 7 I.D.	x	x	
12 O.D. x 8 I.D.		x	
13 O.D. x 6 I.D.		x	x
13 O.D. x 7 I.D.	x	x	
13 O.D. x 8 I.D.			x
13 O.D. x 9 I.D.		x	
14 O.D. x 7 I.D.	x	x	x
14 O.D. x 10 I.D.		x	
15 O.D. x 9 I.D.		x	x
15 O.D. x 10 I.D.		x	
16 O.D. x 10 I.D.	x	x	x
16 O.D. x 12 I.D.	x	x	

technical service

If you make tools with machined-out centers and wish additional information on Crucible Hollow Tool Steel, or technical assistance in solving an application problem, call in a Crucible representative. Our experienced staff of tool steel specialists is always available.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

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National Drawn Works, East Liverpool, Ohio • Sanderson-Halcomb Works, Syracuse, N. Y. • Trent Tube Company, East Troy, Wisconsin

UHF TV

(Concluded from page 28)

adjusted to approximately 90°. An angle of 60° seems best for UHF and VHF combined while 45° is best for UHF. Any all-wave antenna is a compromise so that not all channels will be received with the same strength.

An interesting development in UHF antennas is the employment of built-in antennas. Since at ultra high frequencies, the built-in antenna approaches a half wavelength, it may easily be incorporated in the back of the set. Transmission losses may be sufficiently high from roof-top antennas to cancel the advantage of a high-gain antenna. If a roof-top antenna is used, special attention must be given to the lead-in. The lead must be spaced away from walls and metallic objects to keep down absorption loss. Tubular twin-lead has been developed which has low-loss properties.

With a roof-top antenna, low-loss lead-in, and a converter, how does UHF reception "stack-up" against VHF. Television pictures on UHF can be expected to be just as good as VHF. In some instances, the picture will be better because x-ray equipment, auto ignition noise, neon signs or home appliances don't bother UHF.

As far as station costs are concerned, a UHF broadcasting station can be constructed at about the same cost as a VHF station. But if a UHF channel was given to a VHF station already on the air, much of the equipment and personnel would be done away with reducing the cost considerably. Just as with VHF, color television can be broadcast on UHF frequencies.

Since there are many new applications for licenses, some method or system had to be formulated so that deserving locations would not be without TV service. A temporary system of priorities was set up by the FCC and is as follows: (A1) the existing stations that had to change to a different channel (A2) new stations in cities 40 miles or greater from a TV station (B1) cities where only UHF channels are allocated and where separation may be less than 40 miles from a TV station (B2) UHF channels where all UHF channels are in use (B3) channels for cities having no TV service but are less than 40 miles from not more than one TV transmitter (B4) stations for cities that have one transmitter and are less than 40 miles from any TV station. (B5) stations for cities less than 40 miles from two or more TV transmitters.

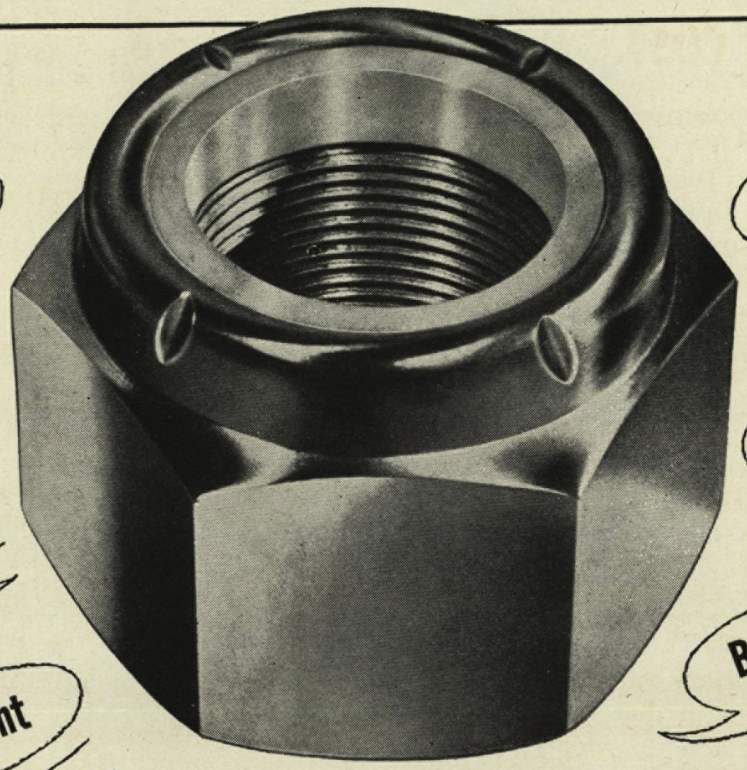
Even with this rigid system, the FCC has a big problem when several applications are made from different interests for the same station license. According to our democratic processes, public hearings are indicated to determine who is best suited to serve the community. All this is time consuming, with results that license granting is slow.

For you who don't care to watch UHF TV, other uses have just been recently found for these frequencies. They are used in a new process in the wine-making industry.

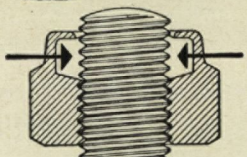
Transmitting Antenna Height In Feet		Grade A Service Radii (in miles) for Powers Shown (Effective Radiated Power)					Grade B Service Radii (in miles) for Powers Shown (Effective Radiated Power)				
		1 kw	10 kw	100 kw	316 kw	1,000 kw	1 kw	10 kw	100 kw	316 kw	1,000 kw
300	Ch 2-6	7	12	21			22	35	50		
	Ch 7-13	7	12	21	28		17	28	40	45	
	Ch 14-83	5	9	15	20	26	9	15	26	31	40
500	Ch 2-6	9	16	27			28	43	57		
	Ch 7-13	9	16	28	35		22	35	46	52	
	Ch 14-83	6.5	11.5	20	25	23	11.5	20	32	40	47
700	Ch 2-6	11	19	31				47	63		
	Ch 7-13	11	20	34	40			40	50	57	
	Ch 14-83	8	13.5	23	30	37		23	37	45	52
1,000	Ch 2-6	13	23	37			39	54	70		
	Ch 7-13	13.5	25	40			33	46	57	63	
	Ch 14-83	9	16.5	28	35	43	16.5	28	43	50	59
2,000	Ch 2-6	19	34	50			52	69	86		
	Ch 7-13	21	40	54	61		47	61	74	80	
	Ch 14-83	13	24	41	49	57	24	41	57	65	74

Service Radii for Radiated Power & Antenna Height

Whenever fastening problems arise...



Consider ELASTIC STOP NUTS



LOOK FOR THE RED LOCKING COLLAR

It is threadless and resilient. Every bolt impresses (but does not cut) its full thread contact in the Red Elastic Collar to fully grip the bolt threads. In addition, this threading action properly seats the metal threads—and eliminates axial play between bolt and nut threads. All Elastic Stop Nuts—regardless of type or size—lock in position anywhere on a bolt or stud, maintain accurate adjustments and seal against liquid seepage. Vibration, impact or stress reversal does not disturb prestressed or positioned settings.

Whenever fastening presents a problem—ESNA is ready with a quick answer. More than 3000 types and sizes of self-locking vibration-proof fasteners—plus the "know-how" of ESNA engineers—are available here at ESNA.

ESNA has long been known as "design headquarters" for self-locking fasteners. Accepted by Army, Navy and Air Force, virtually every aircraft built in the past decade has been Elastic Stop Nut-equipped. On the railroads, in the oil fields, on automobiles and construction equipment, Elastic Stop Nuts manufactured to exacting quality control standards, are doing specialized jobs every day.

Be familiar with the design help ESNA offers. Write us for details on Elastic Stop Nuts. Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, N. J.

ESNA®
TRADE MARK

ELASTIC STOP NUT CORPORATION OF AMERICA

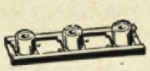

HIGH TENSILE


ANCHOR


HIGH TEMPERATURE


SPLINE


CLINCH


GANG CHANNEL


NYLON CAP

DESIGN HEADQUARTERS FOR SELF-LOCKING FASTENERS

Library Notes

Relativity Relatively Simple

You too can understand Einstein—at least Leopold Infeld thinks so. In the latest biography of Albert Einstein, Infeld even goes so far as to say, "Sometime in the future the principles of relativity may even be taught in high school. The underlying ideas are both simple and essential, although the process of translating results into ordinary language requires time."

Albert Einstein, title of the book, is largely concerned with Einstein's work; however, the presentation is extremely clear even to the non-scientist.

New Lamps for Old

They weren't exactly lamps, but we were able to sell some of our duplicate copies of books (which do enlighten us) and with the cash received we purchased a beautiful new Rand McNally illuminated globe. We're proud of this addition to our library.

The Atom Story, by J. G. Feinberg

The tale of the atom begins not at Cambridge or Hiroshima, but in Greece five centuries before the dawn of Christianity. From that point the author follows its entire and fascinating history—a history replete with such great names as Anaxagoras, Democritus, Bacon, Newton, Dalton, Roentgen, Curie, Einstein and many others. In clear non-technical language he brings the reader step by step along a journey of adventure and discovery as intriguing as a well-told cloak-and-dagger yarn; which, in effect, is what it is. Dr. Feinberg then carries his story into the future with a series of spectacular forecasts which are yet based on present knowledge in such fields as Medicine, Industry, the Land and War.

Among the books with unhappy endings are many checkbooks.

Then there was the small boy who returned an extremely dog-eared but highly technical book to the library. The librarian, looking at the size of the boy and the difficulty of the material, asked, "This is a little technical, isn't it?"

With arms akimbo and chin thrust forward, the boy replied, "It was that way when I got it."

to the

ELECTRICAL ENGINEER

or

PHYSICIST

with an interest in

RADAR

or

ELECTRONICS

Hughes Research and Development Laboratories, one of the nation's leading electronics organizations, are now creating a number of new openings in an important phase of their operation.

Here is what one of these positions offers you:

THE COMPANY

Hughes Research and Development Laboratories, located in Southern California, are presently engaged in the development and production of advanced radar systems, electronic computers and guided missiles.

THE NEW OPENINGS

The positions are for men who will serve as technical advisors to government agencies and companies purchasing Hughes equipment—also as technical consultants with engineers of other companies working on associated equipment. Your specific job would be essentially to help insure successful operation of Hughes equipment in the field.

THE TRAINING

On joining our organization, you will work in the Laboratories for several months to become thoroughly familiar with the equipment which you will later help users to understand and properly employ. If you have already had radar or electronics experience, you will find this knowledge helpful in your new work with us.

WHERE YOU WORK

After your period of training—at full pay—you may (1) remain with the Laboratories in Southern California in an instructive or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Compensation is made for traveling and moving household effects, and married men keep their families with them at all times.

YOUR FUTURE

In one of these positions you will gain all-around experience that will increase your value to our organization as it further expands in the field of electronics. The next few years are certain to see large-scale commercial employment of electronic systems. Your training in and familiarity with the most advanced electronic techniques now will qualify you for even more important future positions.

How to apply:

HUGHES

RESEARCH AND DEVELOPMENT LABORATORIES

Scientific and Engineering Staff
Culver City, Los Angeles County, California

See your Placement Office for appointment with members of our Engineering Staff who will visit your campus. Or address your resumé to the Laboratories.

Stay Stock and Be Happy

By Jim Tatooles, m.e., soph.

Have you ever sat on the corner of the main drag, thinking how lucky you are to own a car, when you suddenly notice below your fender line a modified mess of metal. This piece of pleasure, whether foreign, fast, or frightening, starts the fire burning inside you. "Am I satisfied with this 'Detroit Dragon'?" you ask yourself. After another glance at the panchromatic pink paint on the little monster under your nose, you decide to investigate the other side of this automobile business.

Be it rod, sports, or custom, you can be sure of one thing, there's money involved. Does that put it too bluntly? If so, read on, dear connoisseur. Let's start where most fellows do . . . the rod.

After reading a few volumes of "Hot Rod," "Auto," and a few other publications, you're sure the sport is for you. After all, what could be better than to drag out the headlights of every Cadillac you meet. You've held a pliers in your hand before and know where there's a '32 B that's just begging to be reborn, so with rental of a suitable garage, you're off to a fast start. First, all the fenders go, and the interior is removed. Next, haul out the old block and pull the rear end. After a week of scraping off the 21 year old mud, you find a naked chassis with a sad body staring you in the face. The motor's first so you proceed to start the big build-up. Prices of new Lincoln, Cadillac, and Chrysler V-8s (stock) run quickly upward from the $500-$700 range, so you decide to use the old standby Ford block. After a rebore, new pistons, heads, dual pots, ignition, and a boo-koo list of other parts, you are suddenly shocked at the fact that this project has hit the $450 mark, and the motor's the only thing finished.

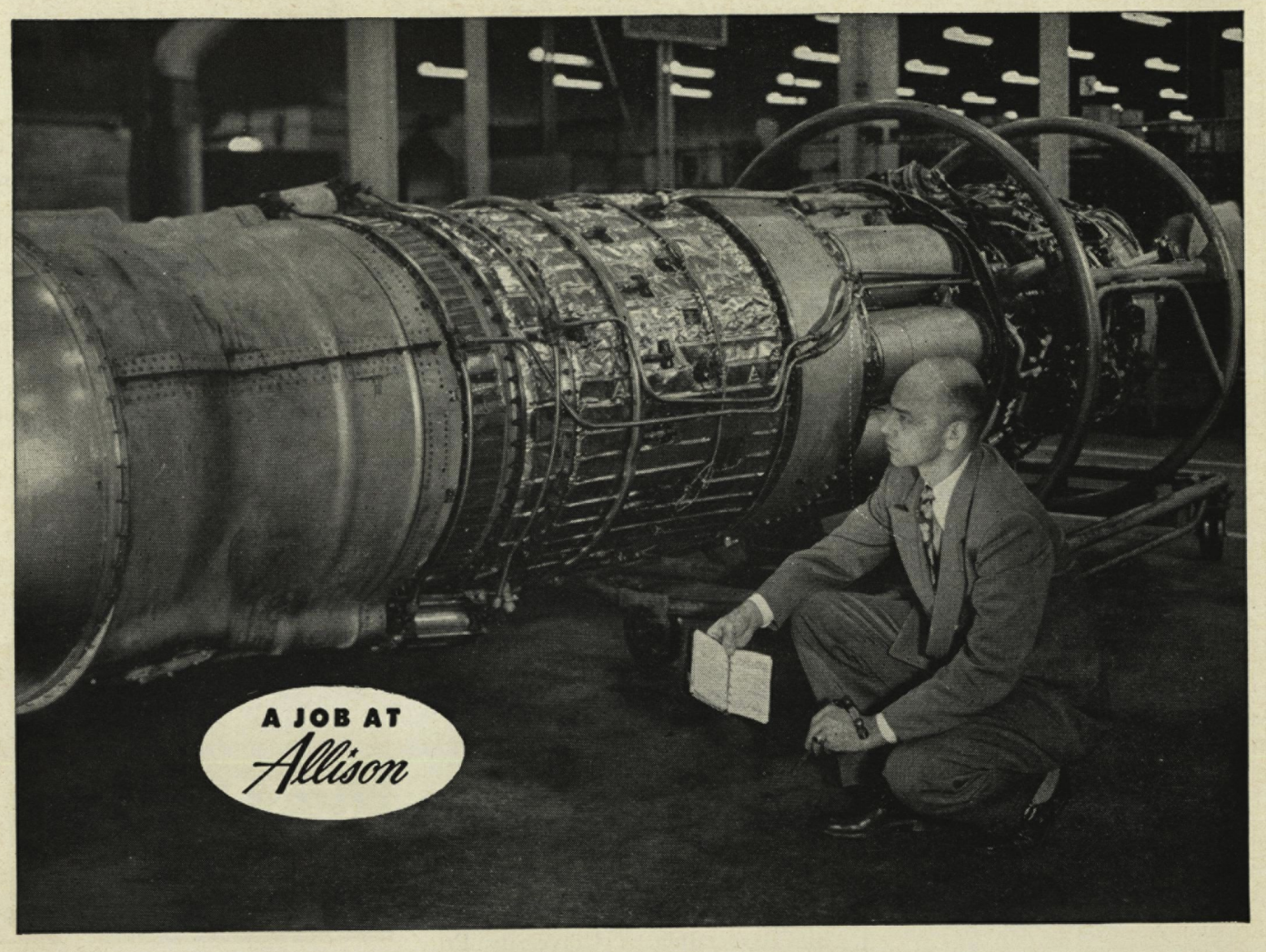
Now what good would the motor be unless it sat in a snappy body? With torch in hand, a few good cuts, and three months work, you finish the beauty and discover after the purchase of tools, hydraulic brakes, instruments, sheet metal, lead, and a first-aid kit, that this part of the bill has set you back about $300 more (if you're lucky). Whoa boy! not so fast; you still need upholstery and paint.. Depending on the degree of shyness that runs in your blood, you get a good job done for another $150.

The big day arrives; the motor is tuned, the sun is out, and the open road calls. Another block in the path of progress; what good is the car unless it wears new shoes. So, with another $100 you're ready for the open road. With the last $5 to your name, you fill the tank with joy juice and turn a deeper purple than your car's skin when you realize that this piece of iron possesses more than $1000 dollars of your hard-earned cash after license, insurance, and miscellaneous matters have been taken care of.

Three weeks out in your rod and the thrill wears off. It seems that those boys in the Krazy Kustoms are getting more attention from the local quail at the drive-in palaces than your little pride is. A week later, after you've traded off the rod for a Merc convertible, you're busy with torch and paddle in hand, leading in all the chrome and cracks you can find. Chopped and channeled (lowered and body sectioned), you're ready for the pipes (exhaust), upholstery, and paint. These last three seem to constitute the finale to a mad concert of mechanical music. When the last bill comes in from the chrome plating emporium for the special job on your grill and bumpers, you thumb thru the others from the glass shop, and the welding concern. A total of $1500 knocks you cold because you didn't realize there was that much in the thing. Are you upset? Heck no! After all, you're the only one in the block that owns an orange pastel convertible with a turquoise plaid top, ain't you? And with the television and portable bar in the back seat you can always open up a cocktail lounge to pull you out of hock.

You've always wanted a good excuse to buy a beret, and seeing that golf is not your game, here it is. With the selling of your custom, another $2,000 buys that stiff-springed, tight, light, foreign car you've seen advertised in your mother's copy of Vogue. All goes well with the thing until the gay day you decide to take a trip. In the well-known burgh of Podunk (pop. 103), the Travis cam goes on the fritz. You're not worried, though. Aside from the fact that the local grease monkey doesn't know what make the machine is, and it takes a metric sized wrench to work on it, New York shipped out the new cam in 3 weeks. After a wonderful vacation in Podunk, you hear of a road race. Well, why not enter? After all it's an amateur affair, isn't it? Another look at the 12,000 dollar "amateur" contestant's cars, and trailers loaded with parts and pit crews soon changes your mind.

On the way home from the affair you notice something strange. A machine passed you by that was quiet, smooth, big, bulky, heavy, and looked like a sight for sore eyes. Now, dear reader, comes the hard part, a conclusion for this piece of patter. Rod, custom, or sports, you have to have some reason for your choice of veering off the straight and narrow beaten path of the American Stock Detroit Iron. I'm crazy, what's your excuse?



● Earle R. Wall, Jr. was graduated from Virginia Polytechnic Institute in 1941 with a B. S. degree in Mechanical Engineering and after a five year tour of duty with the Army came to Allison to do pioneering work on turbo-jet engines.

Earle today has an important job as an engineer in the turbo-jet design group and he is working on afterburners for some of America's newest jet engines. Allison Division was the first aircraft engine manufacturer to produce turbo-jet afterburners. The afterburner is a thrust augmentation unit for jet engines to give the engine more thrust in take-off, climb and combat emergencies. An additional cone is added after the turbine where more fuel is injected into the exhaust gases of the engine and ignited to give a larger amount of thrust.

Earle's job includes the thermodynamic and mechanical design of afterburners which must diffuse exhaust gases from the turbine at temperatures over 1650 degrees Fahrenheit, with a minimum loss of energy, and consume additional fuel for thrust augmentation. After the correct design has been calculated and drawn, prototypes of the afterburner are tested by the Test Control group and Earle then analyzes results. One of the many problems is the endurance life of the exhaust unit. He must make a choice of present metals or search for new metals to withstand the high temperatures and forces of the gases which pass through.

Earle and many other Allison engineers have interesting, important jobs in the science of jet engines. They are making a direct contribution to national defense and adding to their own knowledge of a subject which offers lifetime careers for engineers.

Allison is looking for young men with degrees in **MECHANICAL ENGINEERING, ELECTRICAL ENGINEERING, AERONAUTICAL ENGINEERING** ***and*** **INDUSTRIAL ENGINEERING.** ***There are also a number of openings for majors in Metallurgy, Electronics, Mathematics and Physics.*** Write now for further information: R. G. Greenwood, Engineering College Contact, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.

Allison

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Design, development and production—high power TURBINE ENGINES for modern aircraft . . . heavy duty TRANSMISSIONS for Ordnance and Commercial vehicles . . . DIESEL LOCOMOTIVE PARTS . . . PRECISION BEARINGS for aircraft, Diesel locomotives and special application.

Professor Knipmeyer Leaves Rose

(Concluded from page 16)

the advanced laws that presently govern the practices of engineering in Indiana in his capacity as a member and past chairman of the Indiana State Board of Registration for Professional Engineers and Land Surveyors, on which he has served since 1933.

In recognition of his leadership in matters pertaining to professional registration, Professor Knipmeyer has been selected to head important committees of the National Council of State Boards of Engineering Examiners and also President of the nation wide co-ordinating agency during the years 1941 to 1943.

Prior to the second World War, the professor was commissioned a major in the Army Specialist Reserve and was responsible for studies of a projected Midwest power pool for mobilization purposes.

Professor Knipmeyer holds membership in both the National and Indiana Societies of Professional Engineers, the American Society for Engineering Education, the American Association of University Professors, the American Society for the Advancement of Science, Sigma Xi, Tau Beta Pi and a life membership in the American Institute of Electrical Engineers.

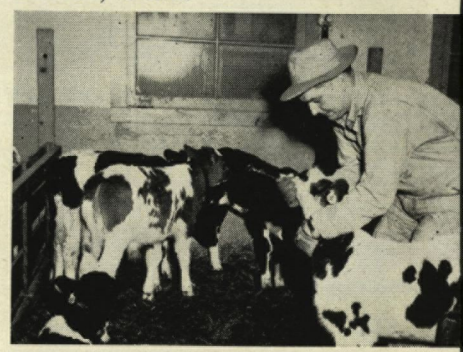
Both Mr. and Mrs. Knipmeyer are natives of Missouri. They came here in the Winter of 1909. Professor Knipmeyer taught two years at the Massachusetts Institute of Technology following his graduation from the University of Michigan with the B.S. degree in electrical engineering before they located here.

They have two children, Mrs. George B. Parker of Concord, Mass., and Carl Knipmeyer of Indianapolis, and three grandchildren.

Wonder Drugs Unlimited

(Concluded from page 13)

Several Rose Polytechnic Institute Alumni are presently employed by Pfizer. They include: Paul Benning June '47, Department Head, Recovery Department; Thomas Cundiff March '48, Department Head, Fermentation Department; Clayton Taylor, March '48, Department Head Blending Department (in charge of preparation of feed concentrates); Francis X. Mead, Oct. '49, Power Engineer; Wayne McCoy, Jan. '49 Assistant Supervisor, Fermentation Department. In addition, Cecil Freeman, July '49, was recently transferred from the Terre Haute plant to the Process Development Division in Groton, Conn.



Treating calves with Terramycin

While production at the Vigo plant is geared to feed concentrates, it is by no means their only product. They also manufacture streptomycin and riboflavin in addition to terramycin and vitamin B-12 for other uses than feed concentrates.

The annual financial report just published by Charles Pfizer & Co. shows an interesting comparison of the importance of antibiotics to our national economy over the last ten years. Pfizer's total sales have jumped from sixteen million dollars in 1943 to over one hundred and seven million dollars in 1952.

William R. Parlett, Cornell '48, Sets Sights on Executive Sales Job

BILL PARLETT has learned that helpful engineering suggestions promote good customer relations.

"Within the next ten years", says William R. Parlett, young Worthington Sales Engineer, "many of the officers of the corporation, district office sales managers and top salesmen will be retired.

"Appreciating the fact that someone must fill these jobs, our management is striving to develop capable leadership among the younger men of the corporation.

"As a prospective Worthington Sales Engineer, I received several months of classroom instruction by works managers, top sales personnel and application engineers at all of the Worthington plants. The background I obtained was a sound basis for further development and learning gained in one of the product sales divisions and then in a district sales office. After obtaining sufficient product knowledge and sales training, I was ready to sell directly to industry. As more important sales assignments are available, I feel I will progress in proportion to my own development and sales performance.

"As a Worthington salesman I contact a class of trade with which it is a pleasure to do business. The company's reputation is a key to a welcome reception by my customers.

"I have found that with Worthington you have job satisfaction, adequate compensation, and unlimited opportunity."

When you're thinking of a good job, think *high*—think *Worthington.* 3.6

FOR ADDITIONAL INFORMATION, see your College Placement Bureau or write to the Personnel and Training Department, Worthington Corporation, Harrison, N. J.

WORTHINGTON

The Sign of Value Around the World

Campus Survey

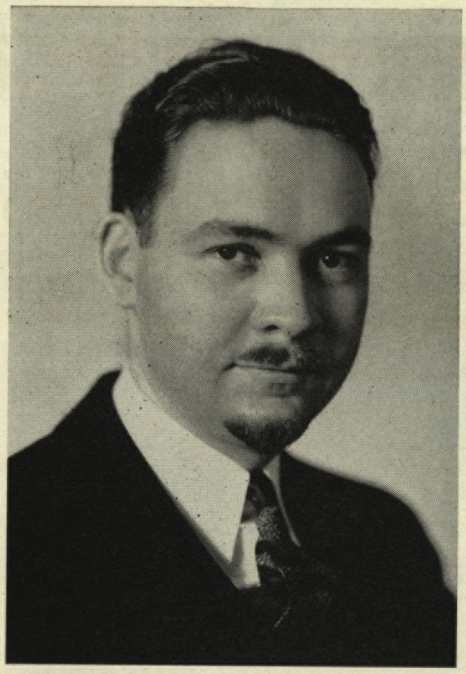
(*Concluded from page* 15)

gical Engineering, Civil Engineering, Electrical Engineering, Engineering Drawing, Engineering Mechaniccs, Engineering Librarians, English, Mathematics and Science, Mechanical and Industrial Engineering, Teaching Aids and Young Engineering Teachers. The chairman of these conferences include Professor Paul E. Stanley, Head of the Department of Aeronautical Engineering at Purdue University; Professor R. E. Rich, Head of the Department of Chemical Engineering at the University of Notre Dame; Professor J. A. McCarthy, Civil Engineering Department at Notre Dame; Dr. Donald T. Canfield, Professor of Electrical Engineering at Purdue University; Professor Henry C. Spencer, Head of the Department of Engineering Drawing, Illinois Institute of Technology; Professor Neil Little, Head of the Department of Engineering Mechanics, Purdue University; Mr. Carson W. Bennett, Librarian, Rose Polytechnic; Professor John L. Bloxsome, Head of the Department of English, Rose Polytechnic; Professor Daniel S. Babb of the Electrical Engineering Department, University of Illinois; Professor C. Robert Egry, Head of the Department of Mechanical Engineering, University of Notre Dame; Dr. Frank D. Carvin, Department of Engineering Mechanics, Illinois Institute of Technology and Mr. D. K. Anderson of the Department of English, Rose Polytechnic.

From three to six members of the Association will participate in the discussions presided over by each of these chairmen, bringing to sharp focus current problems in the training of engineers for work in industry.

A program for ladies has been arranged by a committee headed by Mrs. John L. Bloxsome to include a guided tour through Davis Gardens, a luncheon at the Terre Haute Country Club, to be followed by a reception and tea in the late afternoon on the campus of Rose Polytechnic Institute.

After luncheon at Deming Hall,



Herr Professor Heman von Moench, chairman of I. I. Section A.S.E.E.

the visitors will convene in the Rose auditorium for the annual business meeting and election of officers under the chairmanship of Professor Moench. Dean R. G. Owens of Illinois Institute of Technology will introduce the prize-winning author submitting the best paper in the Young Engineering Teachers' Papers Contest which has just been concluded. Dean A. A. Potter, for many years a recognized leader in the field of engineering education who is retiring this year after faithful service to Purdue University, will introduce the principal speaker, Dr. James W. Parker, formerly President of the Detroit Edison Company, the American Society of Mechanical Engineers, and the Engineers Council for Professional Development. One of the Country's outstanding engineers and executives, Dr. Parker who has vigorously championed the cause of private industry and guided the development of highly efficient central power plants will speak on the topic "The Development of an Engineer".

Assisting with the arrangements for the meeting have been Dr. O. M. Knudsen of the Chemistry Department at Rose who is Secretary-Treasurer of the group, and Institutional Representatives on the Executive Committee who include Max S. Peters, Illinois; E. I. Fiesenheiser, Illinois Institute; D. H. Dahlstrom Northwestern; Leroy D. Graves Notre Dame; George V. Mueller Purdue and Irvin P. Hooper, Rose.

Major Carn To Leave Rose

Major Robert M. Carn, who has served as assistant professor of military science and tactics at Rose since July of 1950, has been ordered to duty with the Far East Air Force.

Major Carn graduated from Pennsylvania State College with a bachelor of science degree in civil engineering in 1931. Called into the Army's Corp of Engineers in 1942, he served with the 1284th Engineer Combat Battalion in the European Theatre where he was on duty on May 7, 1945,—VE Day. The Major was then transferred to the 114th Engineers of the 37th Division and moved to the Philippines where he took part in the preparations for the assault on the Japanese mainland which were terminated by Japan's surrender in the late summer of 1945. Major Carn, at that time a captain, returned to the States and was discharged in December of that year.

Recalled less than a year later in August of 1946, he was sent to Germany when Russia tried to weld the iron curtain around Berlin. There he served with the 862nd Engineer Aviation Battalion during the Berlin Airlift. Coming home in July of 1950, he went on ROTC duty at Rose. Now, on the move again, Major Carn leaves Rose to take up his new duties with the Far East Air Force.

Major Robert M. Carn

THE DU PONT DIGEST

DU PONT SCIENCE AND ENGINEERING GRADUATES MEET THE PUBLIC IN

Technical Sales

More and more, industry is on the lookout for technically trained men and science majors who have an interest in and aptitude for selling. A number of departments at Du Pont prefer men with such training for sales positions. A technical understanding of the properties of a substance helps a man do a better selling job—and offers the customer better service.

Because of the diverse applications of Du Pont's many products, there is a need for sales representatives with widely varying technical backgrounds. There are problems involving chemistry and many types of engineering in such fields as plastics, ceramics, textiles and many others.

Technical men may work in direct sales, sales service, or sales development groups, depending on departmental organization. In some cases technical men handle all phases of selling. In others they deal mainly with customer problems. Some departments also maintain a sales development section that works on technical problems connected with the introduction of a new product or a new application for an established one.

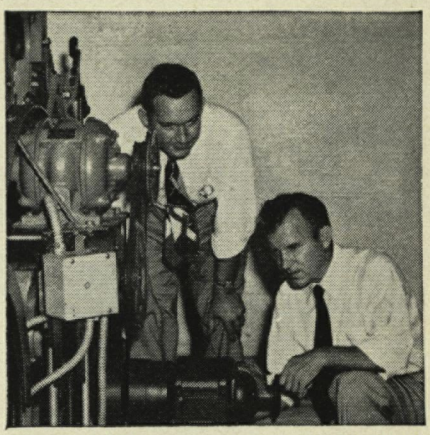
Edgar G. Boyce, *Ashland State (right), helps a customer improve his method of applying silicate adhesive in the manufacture of corrugated boxboard.*

Ivan R. Smith, *B.S. in Ch.E., Kansas State University '40 (right), advises the operator of a galvanizing machine on the efficient use of a Du Pont flux.*

Here are examples of the kind of problems attacked by technical men in Du Pont sales groups:

1. Find a more economical way to apply sodium silicate used in making corrugated paperboard. Du Pont men, as in many other instances, were able to make substantial savings for the customer.

2. Introduce fabrics of "Orlon" acrylic fiber for use in dust filtration. This involved evaluation and modification of filter fabrics in cooperation with makers of dust-control equipment, and with plant personnel having serious dust-recovery problems.



James A. Newman, *B. S. in Ch. E., North Carolina State '40, discusses study of optimum settings and conditions for carding nylon staple with Prof. J. F. Bogdan of North Carolina State's Research Division.*

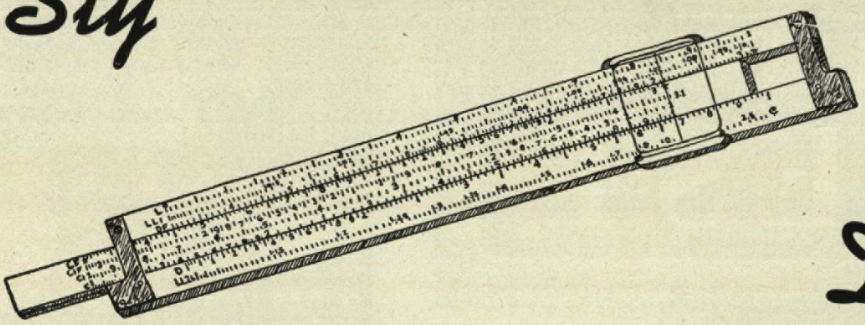
3. Reduce the time needed for processing motion-picture film used by race tracks. Technical service men carried the problem to a research group which developed an emulsion that could be processed in about one-third the former time.

Technical men interested in sales work at Du Pont usually acquire needed background in a laboratory or manufacturing plant. Depending on their interest and abilities, they may then move into technical sales service, sales development, or direct sales.

In any of these fields, the man with the right combination of sales ability and technical knowledge will find not only interesting work but exceptional opportunities for growth in the Company.

College graduates with many types of technical training find opportunities at Du Pont. Write for your copy of "The Du Pont Company and the College Graduate." Address: E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware.

Sly Droolings



Stolen by Dick Bosshardt, m.e., soph., and Ralph Branson, m.e., soph.

Two bopsters, smoking reefers, were suddenly thrown into a panic by the wail of a police siren. Not knowing if their apartment was going to be raided, they threw their butts into the cuckoo clock.

Four hours passed before the cuckoo crawled out, looked around and said, "Man, dig those crazy cigarettes. What time is it?"

* * * * *

Richie M. was sitting in the bar of a downtown hotel. Seated next to him was a gentleman who had definitely had enough and was surveying his empty glass. Something seemed to be decidedly wrong with him and presently he turned to Richie and asked,

"Shay, didjou shpill a glass of beer on me?"

"Certainly not!" answered Richie.

The souse turned to the man on his other side.

"Mishter, didjou by any chance throw a glass of beer in my lap?"

"No!" snapped the man.

The drunk mulled over this information.

"Jusht what I been sushpectin'," he declared. "It'sh an inside job."

* * * * *

"Huh?"

Uh-huh!

If you love me,
Like I love you,
Then shame on us.

* * * * *

At a high school dance a youthful girl was trying to make conversation with her partner.

"I think dancing makes a girl's feet larger, don't you?"

"Yes."

Trying again she bashfully asked, "Do you think swimming gives a girl awfully big shoulders?"

"Yeah."

After a long pause, her partner finally stated, "you must ride quite a bit too."

* * * * *

A sweet young thing was entertaining Shookie in her parlor, when he started to close in on her.

"If you kiss me," she warned, "I'll call a member of the family."

So he promptly kissed her.

"Bro-ther!" she whispered.

* * * * *

C. E. Prof: "Explain the operation of a steam shovel."

Dick: Don't kid me, you can't shovel steam."

* * * * *

The following account, entitled "I Had Eighteen Bottles" is supposedly authentic. Even if it isn't, it has made editors of eighteen joke books very happy:

I had eighteen bottles of whiskey in my cellar and was told by my wife to empty the contents of each and every bottle down the sink, or else. . . . I said I would and proceeded with the unpleasant task. I withdrew the cork from the first bottle and poured the contents down the sink with the exception of one glass, which I drank. I extracted the cork from the second bottle and did likewise with it with the exception of one glass, which I drank. I then withdrew the cork from the third bottle and poured the whiskey down the sink, which I drank. I pulled the cork from the fourth bottle down the sink and poured the bottle down the glass, which I drank. I pulled the bottle from the cork of the next and drank one sink of it, and threw the rest down the glass. I pulled the sink out of the next glass and poured the cork down the bottle. Then I corked the sink with the glass, bottled the drink, and drank the pour. When I had everything emptied, I steadied the house with one hand, counted the glasses, corks, bottles, and sinks with the other which were 29, and as the house came by, I counted them again, and finally had all the houses in one bottle, which I drank. I'm not under the afluence of incohol, as some tinkle peep I am. I'm not half as thunk as you might drink. I fool so feelish I don't know who is me, and the drunker I stand here the longer I get. Oh me!!

PHOTOGRAPHY AT WORK No. 2 in a series:

Knitting mill solves help shortage, attracts and keeps full staff

Hand Knit Hosiery Company of Sheboygan, Wisc., knitters of Wigwam Socks, found many potential employees resisted jobs simply because they didn't know the sort of opportunities offered.

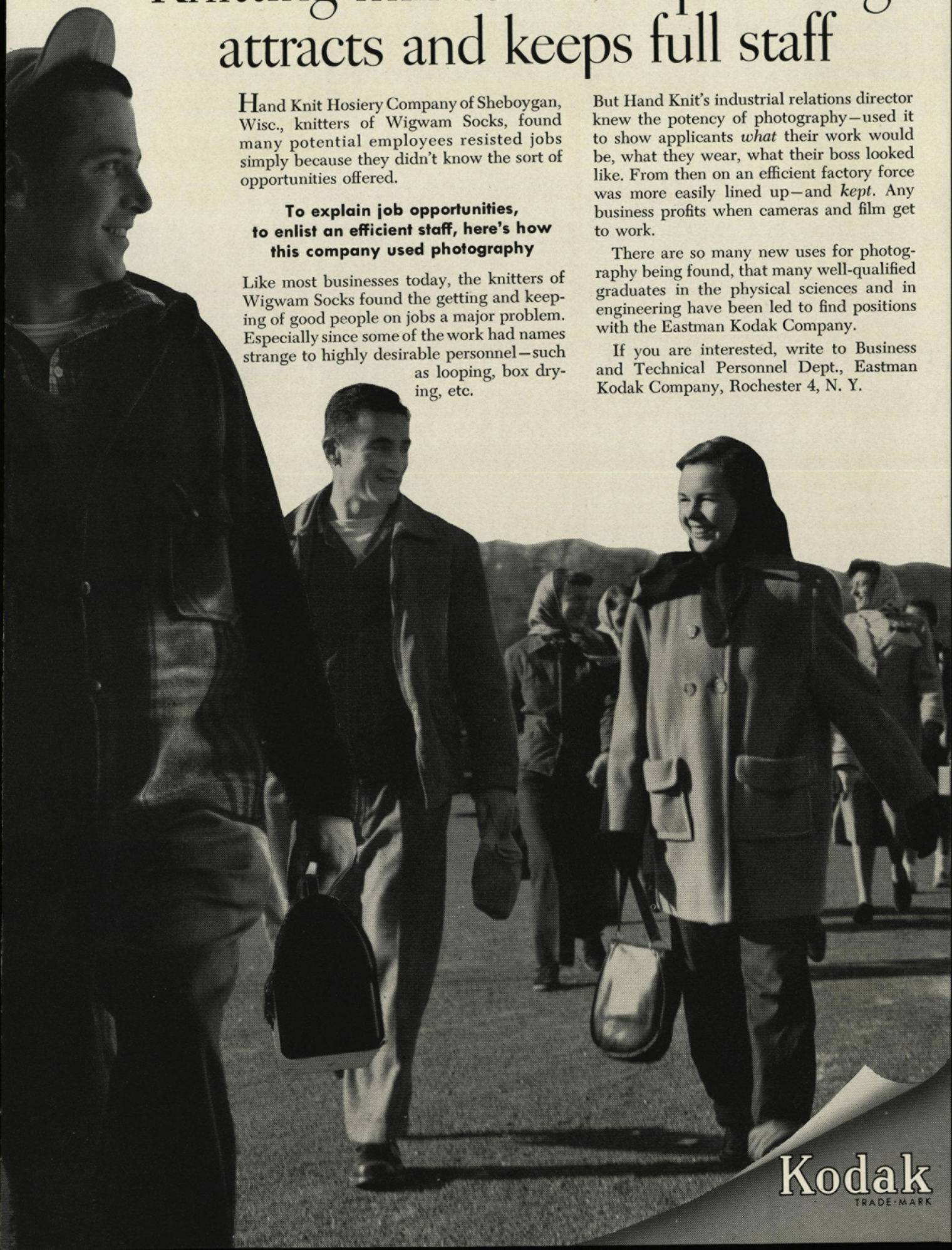
To explain job opportunities, to enlist an efficient staff, here's how this company used photography

Like most businesses today, the knitters of Wigwam Socks found the getting and keeping of good people on jobs a major problem. Especially since some of the work had names strange to highly desirable personnel—such as looping, box drying, etc.

But Hand Knit's industrial relations director knew the potency of photography—used it to show applicants *what* their work would be, what they wear, what their boss looked like. From then on an efficient factory force was more easily lined up—and *kept*. Any business profits when cameras and film get to work.

There are so many new uses for photography being found, that many well-qualified graduates in the physical sciences and in engineering have been led to find positions with the Eastman Kodak Company.

If you are interested, write to Business and Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.



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TEST ENGINEERING PROGRAM—offers engineering graduates opportunities for careers not only in engineering but in all phases of the Company's business. Includes rotating assignments plus opportunities for classroom study.

BUSINESS TRAINING PROGRAM—open to business administration, liberal arts, and other graduates . . . for careers in accounting, finance, administration, and other fields. Includes on-the-job training plus classroom study.

CHEMICAL AND METALLURGICAL PROGRAM—provides rotational assignments in chemistry, chemical engineering, and metallurgy. Also offers graduate-level courses stressing solution of practical engineering problems through application of basic principles of physical chemistry and unit operations.

MANUFACTURING TRAINING PROGRAM—for developing leaders in the field of manufacturing. Open to graduates with a technical education or a general education with technical emphasis.

ADVERTISING TRAINING COURSE—offers graduates career opportunities in all phases of advertising, sales promotion, and public relations work. Includes on-the-job training and a complete classwork program.

PHYSICS PROGRAM—offers physicists rotating assignments in applied research in many fields of physics plus ample opportunity for organized classroom study. Program graduates have gone into such fields as research, development, manufacturing, design, marketing.

FEW companies can offer as broad a range of career opportunities as General Electric. Whether a young man is interested in science or engineering, physics or chemistry, electronics or atomic energy, plastics or air conditioning, accounting or sales, employee relations or advertising, drafting or jet engines . . . he can plan for himself a G-E career.

The training programs summarized here are only a few of the "open doorways" that lead to successful careers in a company where big and important jobs are being done, and where young people of vision and courage are needed to help do them.

If you are interested in building a G-E career after graduation, talk with your placement officer and the G-E representative when he visits your campus. Meanwhile, for further information write to College Editor, Dept., 2-123, General Electric Co., Schenectady 5, New York.

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